SEPT 1982

THEMATIC MAPPER

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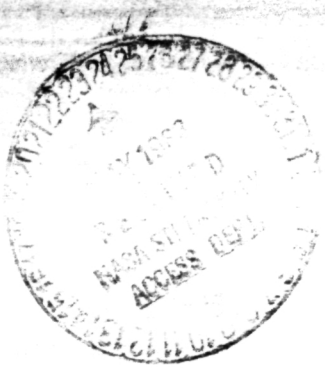
Prepared for
GODDARD SPACE FLIGHT CENTER
Greenbelt, Maryland 20771

CONTRACT NAS 5-24200

FLIGHT MODEL
PRESHIPMENT REVIEW
DATA PACKAGE
VOLUME III - SYSTEM DATA
PART C

Article IV -3A



HUGHES
HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP

HS 236-0019-1679

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4.0 SUMMARY OF LIENS

Data contained in this section summarizes the Failure Report and Request for Deviation/Waiver data presented in each of the subsystem sections of Volume II. Copies of liens written against the system (complete instrument) are also included herein.

4.1 FAILURE REPORTS

The following pages list each Failure Report asscciated with the Flight Model Thematic Mapper, with the symptom and cause of the failure, and corrective action taken. Each Failure Report listed is keyed to the major subsystem against which the failure occurred.

Copies of Failure Reports for failures occurring at the subsystem level are included in Volume II of this data package. Copies of reports for failures occurring at the system level follow the listing in this section.

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F0372	Multiplexer	003	Serial Data output pattern has wrong format	Operator error	Reworked/retested unit Operator instructed to check alternate wiring.	C
FL	F0373	Multiplexer	003	A/D reference voltages of Band 1&5 were low.	Operator error	Reworked/retested unit Operator instructed to verify wiring to blue print.	C
FL	F0374	Multiplexer	003	At input buffer DC response test, output readings of all sensors are wrong.	Workmanship	Reworked/Retested. Straightened all pins. Operator cautioned to use more care when working with hardware.	C
FL	F0381	Multiplexer	003	After incorporating SMA EO. No backup SMA clock output	Rough Handling	Test operator and rework operator were cautioned to use more care.	C
FL (ALL)	F0527	Prime Focal Plane	ALL	High resistance backside contact at interface between silicon detector and Quartz substrate.	Design	New detectors will be fabricated for Protoflight using Waldon 3020 conductive epoxy.	C
FL	F0530	Telescope/ Main Frame	002	Out-of-Flatness condition (less than 0.001 inch) between Telescope Mounting Flange and Main Frame mounting surface.	MFG Procedure	Assembly technique has been changed to bond the mirror after the telescope has been bolted to its interface.	C
FL	F0552	Telescope/Main Frame	002	Specification Requirements were higher than required for operation within system specifications.	Test Procedure	MTF acceptable per Waiver W-136.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F0553	Relay Optics Assy.	003	Inchworm No. 2 command on test box (using Flight IPS) Yields no motion in "down" (retract) direction.	Test Equip.	Engr. erroneously marked up drawing. He was instructed to use more caution when making up future drawings.	C
FL	F0554	Aft Optics Assy.	003	SLC functional test, AHR 51512 operation 173,001 P/N 3 to 11, 4 to 12.	MGF Procedure	All parties concerned have been advised of the importance of cross-checking assembly P/N's and S/N's against the ABCTR's.	C
FL	F0555	Relay Optics Assembly	003	Inchworm No. 2 and on test box yields low MV readings perstep during first steps in either direction, subsequent steps in "down" direction are small approx. 1 to 2 MV.	Test Equipment	Engr. erroneously marked up drawing. He was instructed to use more caution when marking up future drawings.	C
FL	F0560	Prime Focal Plane	203	Ch. 1 and 7 were pegged at -25V. Ch's 2,3,5 and 8 exceed wide band noise spec.	Defective parts	Fets replaced and retested successfully. Corrected action for defective FETS not required.	C
FL	F0581	Prime Focal Plane	201-207	Led Current used for test to low.	Test. Proc.	Test Procedure changed to increase LED drive current to 35%. See ECR 1237101 to Rev. Box 16660.	C
FL	F0591	Cold Focal Plane	003	Coating witness sample failed scotch tape test after humidity test at SBRC.	Design	Witness samples were tested above design limits. Rev. D of drawing 50825 adds tolerances for temp. and humidity.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F0606	Electronic Module	201	Test spec. 16368 in error	No failure	Test Procedure error. EO9732 corrects spec. 16368.	C
FL	F0620	Prime Focal Plane	201	Crosstalk shields not adjusted correctly.	Workmanship	Oper. instructed to make sure proper adjustments are made before final testing.	C
FL	F0622	Prime Focal Plane	201	All 16 channels out of spec.	Test Proc.	EO 9897 corrects spec.	C
FL	F1035	Power Supply	002	Drawing error in 51619 (REV F)	Design	Drawing error. EO 2042A corrects drawing 51619.	C
FL	F1036	Power Supply	002	Component not installed per print	Assy/ Fab error	Instructed operator to follow component orientation as indicated on drawing and specification.	C
FL	F1302	SMA		Terminals E5,E1,E4,E8, are not marked as per drawing 3568902	Workmanship	Technicians instructed to use caution when using terminals.	C
FL	F1305	SMA	5	Improper Cleaning by Vendor	No Failure	Vendor error. SCAR 63891 sent to vendor.	C
FL	F1306	SMA	007	Drawing was not clear	Design	Dwg. error ECR 873583 corrects drawing 3568985.	C
FL	F1307	SMA	--	Harness continuity failure	Workmanship	Assembler cautioned to use extreme care when performing the wiring operation.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F1308	SMA	008	Part was installed backward during assembly.	Assy/Fab error	Assembler cautioned to use extreme care	C
FL	F1322	SMA	005	BRDF testing showed on average total integrated scatter of 0.5%	Test Procedure	EO 64392 corrects drawing 3568899	C
FL	F1325	SMA	004	DAS internal component failure	Test Equipment	HS 236-7830 directs that DAS be red tagged to flag discrepancy and assure repair prior to next use.	C
FL	F1327	SMA	004	Frame to data station fixture shim out of spec.	Test Procedure	ECR 864797 correct problem	C
FL	F1328	SMA	004	TFE S,L,N,SME2; Rev. 2 Rev Scan out of spec	Test Procedure	Test personnel cautioned about sensitivity of shims. ECR 864799 clarifies shim procedure.	C
FL	F1329	SMA	004	Cross Scan RMS exceeded Spec.	Test Equipment	ECR 864796 and EO 13111 corrects test procedure 32015-1004	C
FL	F1330	SMA	004	Unit level out of spec.	Test Procedure	W-121 corrects problem	C
FL	F1342	SMA	004	Improper use of assy. tooling.	Assy/Fab error	Assembly personnel instructed in proper use of Assy. tooling.	C
FL	F1352	SMA	005	Inadequate polishing	Workmanship	Scattering tests to be performed prior to mirror. Acceptance from vendor.	C
FL	F1353	SMA	005	When "scotch clad" stripable protective coating per HMS 16-1768 was stripped from front mirror surface coating was damaged.	Cause unknown	Vendor error SCAR 63891 sent to vendor	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F1439	Power Supply	003	At initial application of voltage, input current was approaching limit set by TS 16518.	Assy/Fab error	Instructed operator tc follow component orientation as indicated on drawing.	C
FL	F1666	Electronic Module	401	All channels on band 3 failed to meet transient frequency response req.	test set up	GAS Flow (N2) increased on FPA.	C
FL	F1667	Harness Assembly	101	Adjusted model 2005 voltage ref. to -1 500V, output was: +5.628V and should be 0.00 ± 0.3V.	Assy/ Fab error	Personnel cautioned to review dwgs and EO to make sure hardware is correct.	C
FL	F1668	Electronic Module	101	Mean resistance of values determined in 4.3.2. and4.3.3 not within spec.	Assy/ Fab error	Technicians have been cautioned to use extreme care when installing components.	C
FL	F1669	Relay Optics	003	Left bank LVDT does not reverse right bank does not respond.	Work-manship	Technicians and Quality personnel instructed to use greater care when assy and inspecting hard-ware.	C
FL	F1717	Prime Focal Plane	103	Requirements of Para. 4.6 (frequency response) and para. 4.7 (wide band noise) are out of tolerance in 8 places.	Work-manship	Design and tooling has been changed to reduced stress in substrates due to handling.	C
FL	F1742	Telescope Assy.	001	Discoloration (reddish hue) observed on mirror surface.	Cancelled	MRB for disposition NCMR 280985	C
FL	F1744	Relay Optics	201	Transformer (T1) measures open at secondary circuit.	Unknown	Parts now sent to MRB for disposition.	C
FL	F1747 Spare	Relay Optics	--	Units would not meet spec (16072) holding	Design	Inchworm translators are now stored in dry nitrogen EO	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F1748 Spare	Relay Optics	--	Unit would not meet spec. (16072)	Test equip.	Tooling to be redesigned to prevent damage on future units.	C
FL	F1761	Prime Focal Plane	101	Offset limits out of spec. on eleven channels	Mfg. procedure	FL PostAmp board (P/N 5094-1A) was used for PF due to schedule considerations. Selects for current PWB had to be redetermined to be compatible with FL Band 1 PreAmp.	C
FL 1764 See Page 30							
FL	F1769	Electronic Module	201	Ch. 7 single ended output linearity defect.	Defective part	Due to tolerence buildup Hybrid had to be changed.	C
FL	F1774	Electronic Module	201	All 16 channels exceed max. gain of 20 DB for max. boost above the 100Hz gain.	Test Procedure	EO 9897 changes requirements and item is within spec.	C
FL	F1776	Electronic Module	201	All 16 channels exceed max gain of 20DB for max boost above the 100 HZ gain.	Test Procedure	EO 9897 changes requirements and item is within spec.	C
FL	F1781	Electronic Module	102	Pins 2,6 and 10 on U35 shorted together.	Assy/ Fab error	Parts disposition on thru MRB ref NCMR #290489	C
FL	F1783	Electronic Module	102	No clock input to U8 (pin 7) and U7 (Pin 1)	Design	EO 9902 corrects design	C
FL	F2240	Prime Focal Plane	102	Channels 7 and 1 wide band noise exceeds limit of 2.4 PA is approximately 3.5 PA.	Workmanship	Band level Assy redesigned and operator cautioned to use greater care during Assy. operation.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F2241	Prime Focal Plane	203	Channels 1,2,8 wide-band noise exceeds limits of 2.4 PA.	Workmanship	Band Level(Assy. redesigned and oper. cautioned to use greater care during assy. operation.)	C
FL	F2387	Cold Focal Plane	201	Band 5 Ch 13 offset. No response to INI frequency.	Mfg. procedure	Improved static discharge precautions initiated.	C
FL	F2662	Prime Focal Plane	208	Channel 8 noise out of spec.	Test equipment	The test detector should have been changed. Personnel have been instructed to do so in the future.	C
FL	F2663	Prime Focal Plane	203	Ch. 7 transient response is out of spec.	Defective part	Replaced resistor for channel 7.	C
FL	F2664	Cold Focal Plane	201	Band 7 had 0.0 drain current and signal Ref. channels have the same voltage for all channels.	Test equipment	Defective meter replaced. Precautions initiated.	C
FL	F2665	Cold Focal Plane Assy.	201	Response output voltage out of spec.	Defective part	Defective detector replaced.	C
FL	F2666	Prime Focal Plane	208	Noise from channel 6 out of spec.	Unknown	Defective FET and associated substrate were replaced.	C
FL	F2667	Cold Focal Plane	201	No signal out of Band 5 Ch 3&8	Mfg. procedure	Improved static discharge	C
FL	F2668	Prime Focal Plane	401	Large amount of crosstalk observed on channels 14 and 15	Workmanship	Operator cautioned to use more care.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F2669	Prime Focal Plane	207-1	Ch 3 transient resp. is 1.25% @ bou sec S/B $\leq$ 1% @ 60, μ sec.	Design	Design problem unit accepted per W-119.	C
FL	F2722	Electronic Module	201	Observed improper waveform during test 16238 para. 3.3.4.	Workmanship	Operator instructed to use greater care when performing rework.	C
FL	F2723	Electronic Module	201	Observed improper current peak amplitude.	Mfg. Procedure	Planner instructed to use greater care and assure he has all applicable EO's, incorporated into his planning.	C
FL	F2724	Electronic Module	201	Phase offset unable to add properly.	Workmanship	Operator and inspector instructed to review planning more carefully to assure that they read all supplements.	C
FL	F2808	Multiplexer	15	Channels 11&12 shorted together	Workmanship	Operator cautioned to use more care in future.	C
FL	F2812	Multiplexer	17	Channel 4 DC restore, DC level changes.	Defective parts	Replaced hydrid.	C
FL	F2813	Multiplexer	16	Channels 9-17 no output	Defective parts	Replaced hydrid.	C
FL	F2814	Multiplexer	003	R1(MX11) overheating	Assy/FAB Error	Operator cautioned to use greater care.	C
FL	F2815	Multiplexer	003	B34 of connector is connected to U24-8 (MX11)	Wiring error	Operator cautioned to use greater care in assembly.	C
FL	F2816	Multiplexer	14	Channel 9 buffer has excessive gain.	Defective parts	Replaced Hydrid.	C
FL	F2817	Multiplexer	003	Conv. MSB output (52) has excessive fall time.	Test Procedure	Test operator instructed to ensure select components are temp. installed before test begins.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F2818	Multiplexer	003	Band Sel Bit 1 (C34) wave form incorrect.	Wiring error	Operator instructed to use greater care when performing rework.	C
FL	F2819	Multiplexer	003	Minor Frame sync. signal (C29) improper.	Workmanship	Operator and inspector cautioned to use greater care in future.	C
FL	F2820	Multiplexer	003	Ret on (C10) timing incorrect (MX08).	Assy/Fab error	Operator and inspector cautioned to use greater care in future.	C
FL	F2821	Multiplexer	003	Excessive common mode noise on buffer output ch.B .	Defective parts	Replaced hydrid	C
FL	F2822	Mutliplexer	13 to 18	Rail voltage "B" test reads in excess of specs tolerance.	Test procedure	TP3569224/SCN 1 Test Procedure modified to relax limits.	C
FL	F2823	Multiplexer	14 to 18	Rail voltage "A" test point reads lower of spec.	Test procedure	Test Procedure modified to relax limits.	C
FL	F2824	Multiplexer	13,14	Rail voltage "A" test point reads in excess of spec.	Test procedure	Test Procedure modified to relax limits.	C
FL	F2825	Multiplexer	16	Sensor 2 input buffer has excessive droop in DC restore mode.	No failure	Passes higher assy. which has tigher requirements.	C
FL	F3557	Mutliplexer	003	J6 (back-up NRZ) output only .25 VP-P looking differentially across J6 pin 1 and 2	Defective parts	Defective IC replaced.	C
FL	F3660	Mutliplexer	003	Band 1 sensor 8 fails DC response test.	Test set-up	Operator instructed to use greater care when mating connectors.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F3864	Power Supply	002	Incorrect lead indexing observed on redundant relay K-3.	Assy/ Fab error	Instructed operator to follow component orientation as indicated on drawing.	C
FL	F3865	Power Supply	004	During Eng. evaluation side using an external pulse generator, mini-inverter failed in high input current mode. Smoke was observed.	Test setup	No further requirement to use an external pulse generator on this or any other Power Supply.	C
FL	F3866	Power Supply	004	Unit demonstrated greater than 375 watts input during pre-vib, short form test.	Test Procedure	Remove maximum input Power requirement per SCN -3 to ts. spec. 16603.	C
FL	F3867	Power Supply	004	Unit failed post vibration short form test.	Defective parts	Replace all 908307-2 relays in Flight Supply with Relays tested to CDU-0702.	C
Fl	F4253	Mutliplexer	003	Band 1 sensor 7 fails no threshold test.	Test equipment	Relay replaced and successful retest conducted.	C
FL	F4254	Multiplexer	003	Numerous X talk errors.	Design	Hardware was accepted per W-124.	C
FL	F4255	Multiplexer	003	Band 1 sensor 13 and Band 5 sensor 6 fails input buffer droop test	Design	Hardware was accepted per W-124.	C
FL	F4256	Mutliplexer	003	Band 1 sensor 7 failed input buffer A/C	Test equipment	Relay replaced and successful retest.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F4257	Multiplexer	003	Numerous X talk failures.	Design	Hardware was accepted per W-124.	C
FL	F4265	Multiplexer	003	Band 6 sensor fails A/D conversing test	Design	Hardware was accepted per W-124.	C
FL	F4266	Multiplexer	003	Band 1 sensor 1 and Band 6 sensor failed A/D thres-hold test.	Design	Hardware was accepted per W-124.	C
FL	F4267	Multiplexer	003	Band 6 sensor 1 failed A/D threshold test	Design	Hardware was accepted per W-124.	C
FL	F4268	Multiplexer	003	Numerous crosstalk failures,	Design	Hardware was accepted per W-124.	C
FL	F4831	Power Supply	004	Center tap current in mini primary winding of XFMR indicates 1 amp of pulsed current.	Wiring error	Operator and wire checker instructed to physically trace wire to termination point.	C
FL	F4832	Power Supply	002	Sync. pulse not observed on MAXI-BRD,	Wiring error	Instructed assembler and wire check inspector to follow wire to termination.	C
FL	F4833	Power Supply	002	During attempt to phase up pulse width on maxi-PWB no load condition.	Test-set-up	Instructed technician to have second technician verify test set-up before voltage applied.	C
FL	F4834	Power Supply	004	Center tap current in the maxi is exceeding 15 amps with no load on maxi redundant.	Work-man-ship	Operator instructed to follow normal workmanship standards to avoid hazardous wire routing.	C
FL	F4835	Power Supply	002	Try to turn maxi up but it only turns "on" a little.	Assy/ Fab Error	Assembler and inspector instructed to follow drawing carefully and verify correct part.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F4836	Power Supply	004	While unit was operating at 35V bus in outgas mode it shut off after about four minutes and could not be commanded on.	Design	EO2046A correct problem.	C
FL	F4837	Power Supply	004	When sync was turned "on", unit would not sync.	Rough Handling	Responsible mfg. supervisor has been informed by the REA as to the proper workmanship methods to use.	C
FL	F7295	Multiplexer	003	Band 2 sensors 4 and 13 failed crosstalk.	Design	Hardware was accepted per W-124.	C
FL	F7296	Multiplexer	003	Band 1 sensors 10 and 14. Band 2 sensors 4 and 14 failed cross talk.	Design	Hardware was accepted per W-124.	C
FL	F7299	Multiplexer	003	Band 2 sensors 4,5 and 14 fail X talk.	Design	Hardware was accepted per W-124.	C
FL	S8014	Electronic Module	201	Jumpers not to print	Workmanship/Assy/Fab	Personnel cautioned to use extreme care when installing jumper wires.	C
FL	S8018	CFPA	201	Feedback loop Band 5 ch 13 measured open circuit when tested per supplement 1 ope. 1300 step 3.	Workmanship	Operator was cautioned to use more care in applying and cleaning up epoxy.	C
FL	S8049	Electronic Module	201	Observed improper waveform during test.	Test set-up	Technicians cautioned to check test set-up prior to test.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8050	Electronic Module	201	Observed improper linearity data over temperature per spec.	Defective parts	Defective part replaced. PB informed of problem.	C
FL	S8051	Electronics Module	201	Phase Ramp; unable to adjust correctly.	Mfg. Proc./ Assy/ Fab	Operator instructed to use greater care to insure proper installation of value parts.	C
FL	S8058	Prime Focal Plane	102-1	Channel no. 1 output pegged at -25 VDC.	Workmanship	Tooling has been redesigned to prevent damage to substrate.	C
FL	S8084	Telescope Assy.	001	Sections of the inside diameter of the mirror broke during mounting of registration surface reference plate onto Primary Mirror.	Test Equipment	New tooling has been provided that does not clamp to primary mirror.	C
FL	S8101	Elec. Module and SMA	201	Partial system connected to TM Elec. Mod. Test set attempts at turning system resulted.	Test Equipment	Test Equipment Repaired.	C
FL	S8106	Radiative Cooler	003	Cooler Intermediate stage Platinum Resistance Temp. Sensor circuit at connector J-2 pin 29 to pin 31 shows open.	Unknown	Future models will be spot bonded to strengthen solder pad area per EO 04269A.	C
FL	S8108	Electronic Module	003	This discrepancy was transferred to S8112 because of error. Wrong pins were			C

odel evel	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
L	S8117	Rad Cooler	003	Transfer to S8136 and consolidate with S8370.			C
L	S8118	Rad Cooler	003	No failure test eng. misread data.			C
L	S8125	Elec-tronic Module	003	J35 Pin F4 (signal ground Band 1 ch 10) open	Test set-up	Test technicians have been alertêd to check mating of connectors more thoroughly.	C
L	S8126	Electronic Module	003	J30 Pin K4 (signal ground band 1 ch 15) open	Test set-up	Test technicans have been alerted to check mating of connectors more thoroughly.	C
L	S8134	Thematic Mapper	003	SMA heater and sun-shade sensor cable harness impedance measurement at P28 Pin 1 to Pin 5 is open S/B 31Ω, Pin 34 to Pin 36 is 13.9Ω S/b 25Ω.	Wiring error	Assembly technicians have been instructed to use proper test equipment.	C
L	S8140	Thematic Mapper		SMA +6.8V Power Supply #2 telemetry read OV when Power Supply #2 was turned on.	Test set-up	Test technicians were cautioned to review test equipment configuration more carefully, especially switch positions, prior to filing Failure Reports.	C
FL	S8201	Prime Focal Plane	401	Diagnostic testing revealed that ground plane on even channel half band substrate (S/N 102-1) was not connected to signal return.	Unknown	Cross talk for channel 2 acceptable per Waiver W-123.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8202 Spare	Prime Focal Plane	201	Ch 6 wide band noise out of spec.	Unknown	Replaced Ch 6 FETS and adjusted crosstalk are within spec pretest data.	C
FL	S8205	Optical Assy.	201	During recheck of select rsistors and capacitors found ch #3 Band 5 to have oscillations.	Work-manship	Nonrequired. Infrequently there are small differences in capacitors between having parts during selection and after part has been soldered to the basis.	C
FL	S8206 Spare	Prime Focal Plane	212	J1-16 to J1-1, J1-5, J1-23 out of spec.	Test equipment	Defected test lead was replaced.	C
FL	S8207	CFPA	201	No output Band 7 Ch 7	Work-manship	Personnel instructed as to proper installation at PWB in housing.	C
FL	S8208	CFPA	201	Band 5 out of spec.	Design	Hardware accepted per W-135.	C
FL	S8225	CFPA	201	Band 5 Ch 9 input short to ground, Ch 11 no out put signal.	Work-manship	The arrays were destroyed during removal from FPA and no further analysis was possible.	C
FL	S8226	CFPA	201	Band 5, Ch.10, 12 difference between signal and Ref. offset measured > $\pm$ 10 MV.	Unknown	Repaired with Ag epoxy per MRCO 393239.	C
FL	S8227	Electronic Module	201	Ch 4 failed to meet the pre-gain resistor (R90) selection requirements without using a component outside the select range	Test procedure	EO 3442A increases select range.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8228 Spare	Prime Focal Plane	210	Channel 7 out of spec.	Unknown	Tooling has been modified with insulating tape to prevent static damage.	C
FL	S8230	CFPA	201	Band 7 even detectors all have low output at 10HZ.	Mfg. procedure	Replaced detector	C
FL	S8283	Electronic Module	201	Ch 13 failed to meet pre-gain resistor (R87) selection requirement without using an out-of-selection component.	Test procedure	EO 3442A broadens select range.	C
FL	S8309	Electronic Module	201	Solder bridge between traces to U31 Pin 7 and U31 Pin 8.	Workmanship	Inspection personnel instructed to use greater care when inspecting solder operations.	C
FL	S8310	Electronic Module	201	TS16234 Para. 3.3.2.2 No -12V output.	Workmanship	Assembly Technician has been cautioned to review orientation device prior to solder.	C
FL	S8311	Electronic Module	202	Test PGM T12 records 5 failures in 2 (10^6) cycles at 50°C.	Unknown	U17 (shift register) replaced.	C
FL	S8312	Electronic Module	201	Test PGM 8 fails word F output - RD7	Assy/ Fab error	Mfg. and Quality personnel have been cautioned to use more care.	C
FL	S8313	Electronic Module	201	Failed para. 3.3.2.3 SBRC 12634 (AR-5) have excessive offset.	Workmanship	MFG and inspection personnel instructed to review drawings more carefully.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8314	Electronic Module	201	Fails to develop proper signal at U3-6 due to bad solder connection at U3-14.	Assy/ Fab error	The responsible inspector has been notified and cautioned to exercise more care.	C
FL	S8315	Electronic Module	201	The all lamps on LED failed to turn on at the proper time in the CALL lamp seq.	Assy/ Fab/ error	Inspection personnel instructed to use more care when inspecting parts prior to shipment.	C
FL	S8316	Electronic Module	102	'Crosstalk' AR 2-8 to AR 2-10.	No failure	FR open in error.	C
FL	S8317	Prime Focal Plane	201	Channel 4 noise is 2.6 PA; channel 9 noise is 2.9PA.	Unknown	Hardware accepted per W-116.	C
FL	S8318	Prime Focal Plane	401	Ch's 1,5,9,13 exhibit out of spec transient/ frequency response and high.	Unknown	Hardware accepted per W-123.	C
FL	S8319	CFPA	101	Ch.10 exhibits no response to injected signal ch. 12	Workmanship	Assy. personnel instructed to use greater care when doing rework with epoxy.	C
FL	S8320	Electronic Module -	201	Output low of Channel 11 (Hybrid U4) short circuited (~8 ohms) to signal ground.	Workmanship	Mfg. personnel have been cautioned to use greater care when solder components.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8321	Electronic Module	201	AT S2KHZ Frequency response was: 2.24 db (should be -2.50 to -3.01) ch 6 only	Workman-ship	Hardware accepted per W-120, Oper. cautioned to use greater care.	C
FL	S8322	Prime Focal Plane	201	Ch. 5,13,14,15 and 16 exceeds transient response.	Work-man-ship	Hardware accepted per W117, Oper. cautioned to use greater care in assembly.	C
FL	S8323	Prime Focal Plane	201	No continuity between J2-16 and J2-10 on evenside of preamp Assy.	Assy/ Fab/ Error	Test procedure had been changed to check continuity between all grounds Ret. Pins.	C
FL	S8324	Prime Focal Plane	401	Ch's 1,5,9 and 13 Frequency Response out of spec.	Work-man-ship	W-115 accepts hardware. Oper. cautioned to use more care when performing Assembly operations.	C
FL	S8325	Electronics Module	201	Ch's 1,7,8,13, 15 DC offset out of spec.	Test Pro-cedure	ECR #TM 2512/01R1 corrects TS 16597.	C
FL	S8326	Electronics Module	201	Ch 6,8 out of spec.	Test Pro-cedure	ECR #TM 2512/01R1 corrects TS 16597	C
FL	S8327	Electronics Module	201	Ch 5,8,12,13 out of spec	Test Pro-cedure	ECR #TM 2512/01R1 corrects TS 16597.	C
FL	S8328 Spare	Cold Focal Plane	301	Pins 15,16 show 16.6Ω and .5Ω shorts respectively - should be open.	Test Equip-ment	Text Box was rewired per switch legend. Drawing #77514.	C
FL	S8329	Electronics Module	201	Ch's. 1,7,8 out of spec. on offset	Test Proce-	ECR #TM 2512/01R1 corrects TS 16597.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8340	CFPA	201	Band 7, Ch 8 & 16 unable to set bias adjust per 16192 para 4.10.	Unknown	Wirebond puller was at fault. Wire bond puller has been repaired to prevent static discharge.	C
FL	S8341	Electronic Module	101	Resistors R72 and R88 are reversed.	Work-man-ship	Personnel advised to use care when removing and reinstalling components.	C
FL	S8342	Prime Focal Plane	201	Band 4,ch.16 wide band noise is 2,8, PA should be $\leq$ 2.4 pA.	Unknown	Hardware accepted per W-118.	C
FL	S8343	Electronic Module	201	SMA voltages out of spec.	Test Proce-dure	EO 4180A and 4199A correct 16704.	C
FL	S8361	Aft Optics Assembly	003	Shutter natural period has changed is presently out of spec.	Mfg. proce-dure	Planning changed on AHR	C
FL	S8362	Aft Optics Assembly	003	Shutter natural period has changed is presently out of spec.	Work-man-ship	Operator cautioned to use more care.	C
FL	S8363	Electronic Module	201	Channels R81 thru R96 out of spec.	Test Proce-dure	EO4059A corrects TP 16704.	C
FL	S8364	Electronic Module	201	When main shutter on (CMD13) issued. The redundant shutter driver was not commanded off.	Assy/ Fab error	Mfg. Eng. supervisor informed of the error and has agreed to exercise greater care during future planning operations.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8365	Electronic Module	201	Kleeburger, Chs 1, 9,10	Work-man-ship	Assembly technician caut'oned to check all wirings and connections thoroughly.	C
FL	S8367	Electronic Module	201	Shutter taps stops on turn on at 0°C Ref. per 139.5μs.	Work-man-ship	Test personnel instructed to be more careful when selecting resistors values.	C
FL	S8368	Elect.onic Module	101	J-24-5 to chassis read approx. 1.6 m with slowcharge like a capacitor leading DV.M.	Torn In-sul-ation	Unable to determine cause of torn insulation.	C
FL	S8370	CFPA	202	FR transferred to FR 8136 and con-solidate with S8117.	Can-celled		
FL	S8371	Relay Optics	?	Inchworm would not respond to move command.	Test Equip-ment	Wearsaver in question was red tagged and will not be used until repaired inspected.	C
FL	S8378	Aft Optics Assy.	003	Resistance measurements per spec. 17068 were too high in some cases.	Mfg. Proce-dure	Inspect, personnel have been instructed to assure torque has been adjusted for drag allow-ance prior to torque operations.	C
FL	S8384	Electronic Module	201	Redundant Shutter Phase Lock Tele-metry word G Bit 6 reads incorrectly "Hi" when the re-dundant shutter function is com-manded off (CMO "of")	Assy/ Fab Error	Supervisor, assemblers and inspectors cautioned to use more care.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8387	Aft Optics Bulkhead	003	All 10K thermistor readings do not agree with spec.	Test Procedure	EO 4146A corrects TP 17068.	C
FL	S8390	Electronic Module	201	SMA ± 28V out of spec.	Test Procedure	EO 4159A corrects TP 16704	C
FL	S8392	SMA	003	Power to SMA applied, per TP 32015-301; SMA did not operate.	Design	EO 4160 corrects test set design. problem.	C
FL	S8394	CFPA	201	Electrical shorts between FPW cables and radiative coole. structure.	Design	EO4173 corrects tolerance built up between FPW cable shields and cooler structure.	C
FL	S8395	TM		Attempt was made to bring TM up to full mode the TM FSI appeared to go into full current.	Test Set UP	Test personnel have been cautioned to use extreme care when working with test equipment and assure they leave test equipment in proper configuration after completed trouble-shooting.	C
FL	S8405	See Page 30					
FL	S8407	Electronic Module	201	Ch. 5 R83 is out of spec.	Work-manship	Mfg. personnel instructed to use greater care when removing and reinstating select resistors.	C
FL	S8438	Cold FPA	201	Band 5, ch's 10 and 12 exhibit excessively high out put during injected signal test.	Work-manship	Operator to use greater care when making epoxy repairs.	C
FL	S8439 Spare	Cold FPA	401	Pin 3 and Pin 13 do not meet spec.	Work-manship	Operator cautioned to use more care in trimming of cable.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8440	Cold FPA	401	Chs 1,2,4,5,7,9,10 11,13, out of spec. for transient response; ch's 4,5,6,7,8,10,12, 14,16 out of frequency spec.	Defect-ive Parts	Waiver W-123 allows use of this assy.	C
FL	S8443	CFPA	201	Band 5, ch. 12 out of spec.	Test Equip.	Wire bond puller was found to be defective. Pull tester was replaced.	C
FL	S8446	Electronic Module	201	Channel 8 pegged	Work-man-ship	Inspection personnel have been instructed to use greater care.	C
FL	S8447	Electronic Module	401	Ch's 2,3,4,5,6 7,8,10,11,12,14, 15, and 16 fail to meet specs.	Test set-up	Gas Flow (N2) increased on FPA. Insp. Personnel instructed to use greater care when inspecting solder operations.	C
FL	S8456	Electronic Module	201	Word G failed once during data cycling A+0°C.	Work-man-ship	Insp. personnel in-structed to use greater care when inspecting solder operations.	C
FL	S8460	Electronic Module	?	Signal was inverted at Pins 177,178,175, 176,179,180,173 and 174	Assy/ Fab error	Mfg & Insp. personnel instructed to review drawings with greater care to assure proper installation of components.	C
FL	S8469	RAD Cooler	003	Excess 60 HZ noise on band 5&7 channels.	Test set-up	Test personnel instructed in proper techniques to be employed in grounding low level circuitry.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F0170	SMA	5	Signal Return shorted	Workmanship	Tech. cautioned to use greater care in the positioning & utilization of heat shrink sleeving.	C
FL	F3658	Multiplexer	19	Fails skps 128-131. Threshold doesn't change. All other skips okay.			
FL	F3868	Power Supply	004	Unit failed Thermal cycle performance test.			0
FL	F4252	Multi-plexer	19	No A/O conversion			0
FL	F5771	TM		Band/Channel 9 is dead. Band 4 odd channels have coherent noise which is observable on video display.	Test Set-Up	Coherent noise problem was due to coupling between unused LED's and Band 4. This condition was corrected by grounding unused LED's.	C
FL	F5772	Rad. Cooler Assy.	003	Bands, DET 9 Video signal appears inverted at SIU.	Test Set-Up	Test equip.cable had two terminations reversed. If this were discovered prior to two hours after test initiation no Failure Report would be required.	C
FL	S8102	Elect. Mod. & SMA	201	Using redundant Power Supply w/partial mode loads (8.3 Amps Avg) after 2 hours operation @ 28 VDC input. A shutdown and subsequent restart occurred.			0
FL	S8107	Elect. Module	003	J24 Pins 5&6 +1-20V return reads .66 ohms to chassis ground.	Design	ECA 272 2/01 lengthens sleeving and hat covers screws.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8109	Electronic Module	003	Pin P1 on J10 and J13 should read approx. .7 ohms between them. They read open.	Test Set Up	Configuration not appropriate for test. Engineers are cognizant of the problem and will review set up more carefully.	C
FL	S8110	Electronic Module	003	Pin 14 on J26 should read 1 ohm max. and it reads 38.7K ohms.	Defective parts	ECA 2722101 will standarize mounting procedure and will prevent similar discrepancies.	C
FL	S8112	Electronic Module	003	J24 Pins 11,12, 29,30,31,32 read 86.35K ohms to chassis ground and should read > 10 mag ohms.	Unknown	ECA 2722 will standize this mounting procedure and will prevent future occurence.	C
FL	S8116	SM Electronics	003	Chassis ground shorted to unipoint -P26 Pins 13 and 14 reads. 4.5 ohms to chassis ground.	Workmanship	Supervisor was instructed to inspect for this condition and stagger shield terminations.	C
FL	S8124	Rad Cooler Assy	201	Cold Stage heater does not control. Power remains applied to heater regardless of PRT resistance no +1-20 On +1 -18V on output of cable W5061 and safehold heater 1 was 11.3V instead of 28.V J24 filter started getting warm. Kepco drew	Test Set-up	Eng. was cautioned to review test set-up prior to application of power.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8128	Electronic Module		Zero degree Ref. to (Q5 Q0 turn-around) should be 5.30 +/- .50 sec. and it read 7.8 m.sec.			0
FL	S8129	Prime Focal Plane		Zero degree Ref. to Q5 (Q5 Q0 turn-around) should be 5.30 +/- .50 sec and it read 7.8 m sec.			0
FL	S8130	Prime Focal Plane		Cal Lamp 2 is drawing 109.4 mas and should draw 108 mas and Cal Lamp 3 is drawing 110.1 mrs and it should draw 108 mas.	Test Set-Up	ECR 972732 will update data base.	C
FL	S8131	TM		One bit is not operating properly when putting telemetry in the data stream.	Test Equip-ment	No failure, test personnel informed to trouble shoot Test Equipment before initiating FR.	C
FL	S8133	Elec. Module		After fusible links switches have been closed and 2.3 volts are read on test box (which is ok) and then all switches are opened at 16 to 20 volt remains and slowly decrease to zero (3 min. period)	Test Set-Up	Shorting the leads together just prior to connection to the item under test zeroed the DVM and produced acceptable readings.	C
FL	S8136	Rad Cooler Assy	003	Band 5 ch 9,10,12 have 1.17mV 1.44mV, 0.605mV wide band noise. Noise is approx. 200 KHz oscillation with popcorn noise on Ch 9&10.			0

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8139	Electronic Module	202	Control temp. voltage out of spec.	Test Procedure	EO 4365A changes tolerances so that previous readings are now within spec.	C
FL	S8143	Rad Cooler Door Assy	003	Motor when electrically activated will not move door open or closed.	Assy. Fab./ Error	Removed motor 51258 S/N 004. Installed motor 51258 S/N 001. Retested per 16912. Vendor will take precautions to prevent similar problems from reoccurring.	C
FL	S8180	Electronic Module	202	"Temp Error" voltage out of tolerance.	Test Pro-cedure	EO 4366A changes tolerances so that previous readings are now within spec.	C
FL	S8209	Cold Focal Plane	301	Band 7 ch. 6 feed-back cap appears shorted - does not respond by rolling off at high frequencies.	Work-man-ship	Technicians were cautioned to use extreme care.	C
FL	S8211 Spare	Prime Focal Plane	501	Ch 15 no response DC offset is adjust-able, high noise with 1/f noise evident.	Unknown	Waiver W-154 will correct problem.	C
FL	S8212 Spare	Prime Focal Plane	501	Ch 1,5,7,15 out of spec. Ch 9,13 out of spec.	Work-man-ship	Waiver W-155 will correct problem.	C
FL	S8218 Spare	Cold Focal Plane	301	Drain currents for bands 5&7 out of spec.			
FL	S8229	Prime Focal Plane	212-1	Channels 1&2 exhibit excessive noise after repeated changes of FETS.			O

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8231	Prime Focal Plane	211-1	Ch. 1 fails to meet transient response requirements.	Design	Waiver W-157 will correct problem.	C
FL	S8372	Electronic Module		Redundant shutter would not phase-lock.			O
FL	S8401	Prime Focal Plane	101-1	Frequency response is +.6dB at 20 KHZ should be +.1 to -0.9 dB	Design	Waiver W-158 will correct problem.	C
FL	S8461	Cold Focal Plane	301	Band 7, ch. 7 shows 10 M ohm short to ground at Fet Gate.	Work-man-ship	Assembly Technicians were cautioned to check for this type of dis-crepancy during manufacturing operations.	C
FL	S8369	Scan Mirror Assy.	004	Looking into SMA P2 M break-out box, pin 13 reads 84K Ω to chassis w/SME J2/SAM P1 de-mated.	Test set-up	No Failure - readings were found during trouble-shooting operations.	C
FL	S8127	TM	TM		Work-man-ship	Caused by Failure to in-stall insert in cable connector. The technicians have been advised of this discrepancy and cautioned to prevent a reoccurrence of this problem.	C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed	
FL	S8213 Spare	CFPA	301	Band 7 Ch 7+15 out of Spec.			O	
FL	F5774	TM	003	IFOU sizes too large and response to line source 2 IFOU's from center of detector exceeds 1%.			O	
FL	F5776	TM	003	Bands 1 and 2 show secondary peaks in sensitivity well away from the nominal channel centers. (Largest) second peak in Band 1 Det. 1 about 10% of peak signal + 13 IFOU's away).			O	
FL Spare	S8219	Cold Focal Plane	301	Band 7 Ch 10 no response to injected signal @ all frequency.	Design	Removed crosstalk shield and insulated parts per 4464A.		C
FL	F5777	TM	003	Bands 5&7 are 26.25 IFOU's apart spec. is 26.0 ± .2 IFOU's (This FR is a result of Post-Test Examination of test data).			O	
FL	F5778	TM 51065	003	Band 1 videosignals from detectors 8,10,11,14&16 shows large offsets. (Band 4,DET 16 has same problem) in the dark vidver collects.				
FL	F5779	TM 51065	003	Band 1 video exhibits unacceptable coherent noise levels.				
FL	S8464	Elec. Module 50904-1		Band 1 offsets out of spec. Should be -4.00 ± 0, 20UDC. Are Ch: 3-426U,no failure 4 -4.46,6 -4.34, 10 -717, 14 - 4.23, 15 -4.55.	No Failure	New select resistors were installed. Retested successfully on 6-28-82		C

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8150	Rad Cooler Door Assy.		SHC screw, was noticeably loose. After X-Axis vibration, 2 FL. These screws fasten the electromagnet brackets to the door assy. There are also 4 other fasteners for these brackets.	Design	Spot bonding screws after torquing to prevent loosening. Washer was changed from small pattern to large pattern to increase rigidity. EO 4528A.	C
FL	S8021	Elec. Module	202	When switching from one serial receiver to the other, a move command is sent to actually move the door also when a close command (TM:134) is first sent in the redundant configuration, the cooler door moves.			
FL	S8145	Rad Cooler Door Assy.	003	Outgas position cannot be adjusted to meet Para. 3,2,4.4 Spec. 16912. Rev. C.	Design	EO 4457A caused resistor value in timing circuit to match motor speed and gearing/backlash characteristics.	C
FL	S8158	TM 51065	003	Change in noise level in band 3, channel 12. Value changed from approximately .5 counts RM5 noise to 1.0 counts RM5 noise.			
FL	S8160	TM	003	Excess noise band 5 ch 7-9.3 KHZ coherent noise. Should be no observable coherent noise.			
FL	S8162	TM	003	Greater than 0.5% variation between channels in spectral matching test. Band 1 0.65%, Band 4 1.07%.			
FL	S8163	TM	003	Band 3 Detector 4 low output; during set-up for 8L07.(intermittant)			

›del :vel	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
.	S8167	TM	003	When the Mapper is turned on with the SME and shutter on at the same time the shutter bangs.			
.	S8168	TM	003	Lowgrain in Band 6: channel 11,28% low; channel 3, -2% low (channel 2, 9% high; channel 4, 7% high)			
.	F1764	Electronic Module	201	All 16 channels exceed Max. gain of 20DB for Max Boost above the 100 Hz gain.	Test Procedure	EO 9897 changes require-ments and item is within spec.	C
.	S8405	Rad Cooler	201	Hi noise Ch. 8	Unknown	Hybrd replaced.	

FAILURE REPORT ANALYSIS
(Addendum for Pre-Shipment Review Meeting)

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	F2369	TM	003	During Post Z Axis SRT, LVDT 3 indicated inchworm motion.	No Discrepancy	Failure Report was opened to document LVDT motion. Inchworm repositioned optics.	O
FL	F1787	TM	003	No readings for cold preamp (TLM) temperature and the isolated -19 volts (TLM).	Workmanship	Bent connector Pin was straightened and technicians cautioned to use care when mating/demating connectors.	C
FL	F2717	TM	003	Square wave response is low. Approx. 0.34 to 0.36 after rework. Prior to rework the values were approx. 0.40 to 0.42.	Workmanship	Loosening and retorquing of bolts combined with lapping of surfaces to relieve stresses, allowed successful realignment.	C
FL	F2718	TM	003	No readings for TM baseplate telemetry at J15.	Unknown	Cause is unknown. W173 authorizes use as is.	C
FL	F2719	TM	003	Relay Optics Telemetry channel appears to have a short circuit to ground.			O
FL	F5780	TM	003	Signal (video) output of Band 5, detector 10 is approx. 50-60% of all other Band 5 detectors. Band 5, Det. 10 noise level appears high.			O
FL	S8149	TM	003	When door is commanded to open from closed position, it sporadically will require two commands instead of one to the	Mfg.	Limit switch was readjusted. Technicians now understand adjustment procedure.	C

FAILURE REPORT ANALYSIS
(Addendum for Pre-Shipment Review Meeting)

Model Level	FR #	Unit Name	Unit S/N	Symptom/Description	Cause	Corrective Action	Status Open/Closed
FL	S8159	TM	003	MUX 1 data does not arrive at Demux.	Test Equip-ment	Replaced defective cable W4004/P8. Discrepant cable repaired.	C
FL	S8161	TM	003	Shutter data is dark. S/B 2 to 5 count range, is from 28 to 255 for channel 9 of Bands 3,4,5 and 7.			O
FL	S8169	Optical Assembly	003	Resistance between mounting foot #2 and Aft Optics Bulk-head is 62.0 milliohms, S/B $\leq$ 15 milliohms.	Test Set-Up	Planning has been changed to show reconnection of ground straps prior to performing resistance checks.	C
FL	F2375	TM	003	Band 6, Channel 1, low signal from calibrator in gain linearity test.			O
FL	F2370	TM	003	Band 6 output constant at 85 counts for all four detectors.	Drawing Error	EO 4686A corrects dwg. error.	O
FL	F2385	TM	003	U3 $\pm$ 15V regulator The -15.0V output failed to current limit.	Drawing Error	EO 4686A corrects dwg. error.	O

TM

P/N 51065

FLIGHT Failure Report No.		PROTOFLIGHT Failure Report No.		ENGINEER Failure Report No.	
Open	Closed	Open	Closed	Open	Closed
	F2375 F1787		F0544		F0504
F2369	F2385 F5777		F0551		F0505
F2370	F2718 F27I7		F0573		F0508
F2369	F5771		F1739		F0510
F2370	F5772		F1740		F0511
	F5778		E2636		F0513
F5774	F5779		F2644		F0521
F5776	S8101		F2691		F0532
	S8107		F2709		F0533
S8167	S8127		F2765		F2714
	S8131		F2771		F2715
	S8134		F2772		F2745
	S8158		F2773		F2747
	S8160		F2774		F2748
	S8161		F2775		F2791
	S8163		F2776		F5170
	S8168		F2777		F5181
			F2793		F5184
			F2794		F5185
			F2795		S8009
			F2799		
			F5171		
			F5172		
			F5176		
			F5180		
			F5182		
			F5187		
			S8093		
			S8300		
			S8448		
			S8453		
			S8454		

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: D. E. Sauers

CC: W. D. Adams
L. Altman

DATE: 24 June 1982

REF: PE 137:82

SUBJECT: Corrective Action for Failure Report No. P5772

FROM: L. O'Connell

BLDG. B11 MAIL STA. 39

EXT. 6357

Attached is a copy of subject Failure Report and QCHR ES 67093 for your information and files.

At this time contract quantities of Thematic Mapper hardware are complete and no follow-on is anticipated. However, test equipment and cable fabrication are common to all programs and Inspection/Test personnel should be alerted to make sure applicable hardware is fabricated and wrung-out per applicable drawings and schematics.

Please inform Inspection/Test personnel under your cognizance of subject discrepancy and review your workmanship standards with them so they understand the importance of assuring that cable terminations are per print.

L. O'Connell
Reliability Manager
Thematic Mapper Program

/lbg

HUGHES

HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

F 5772

ORIGINATOR

1. PROGRAM NAME AND NUMBER	2. GLA	3. MODEL	4. TIME OBSERVED	5. DATE OBSERVED
THEMATIC MAPPER PL1162		F1	1111	MO MAY DA 20 YR 82

6. HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☐ SUBSYSTEM ☒ ASSEMBLY ☐ MODULE ☐ CARD ☐ SYSTEM ☐ UNIT ☐ SUBASSEMBLY ☐ MICAM ☐ PART

EQUIPMENT IDENTIFICATION	NAME	PART NUMBER	S/N	MANUFACTURER
7. SUBSYSTEM	RADIATIVE COOLER ASSY	52100		SBRC
8. UNIT				
9. ☐ ASSEMBLY ☐ SUBASSEMBLY				
10. ☐ MODULE ☐ MICAM ☐ CARD				
11. OTHER	CPPA PREAMP ASSY			SBRC

12. TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ QUALIFICATION ☒ INTEGRATION ☐ LAUNCH OPERATIONS ☐ IN-PROCESS ☐ ACCEPTANCE ☐ SYSTEM ☐

13. ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☒ AMBIENT ☐ RADIATION ☐ TEMP ____ ☐ THERMAL VAC ____ HRS AT ____ ☐ EMC/RI ☐ VIBRATION ____ AXIS FOR ____ MIN TYPE ____ ☐ OTHER

14. DESCRIPTION OF FAILURE: BAND5 DET9 VIDEO SIGNAL APPEARS INVERTED AT SIU, SEEM LIKE HI/LO DIFFERENTIAL SIGNAL INVERSION SOMEWHERE IN SIGNAL PATH: RAD-COOLER PREAMP; AATS; SIU FRONT END.

15. TEST PROCEDURE: TP32015-504 | PARA: 5.5 | 16. ORIGINATOR: G. PLEWS | ORG: 2242 | DATE: 820520 | 17. CONTINUATION ☐ SHEET USED

ENGINEERING EVALUATION

16. VERIFICATION AND FAILURE ANALYSIS: The input to AATS was correct polarity and the output to the SIU was INVERTED. The output of the AATS was checked and it was correct. This left the cable to be check. The cable had pins K4 and K5 reversed.

19. FAILED ITEM NAME AND PART NUMBER: cable W563, between AATS-SIU

20. ☒ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE: The pins to be reversed at the SIU end.

21. AUTHORIZATION: [signature] | ORG: 22-31 | DATE: 5-27-82 | 22. CONTINUATION ☐ SHEET USED

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: PINS K4 & K5 EXTRACTED AT PIN (SIU END) AND REINSERTED TO PROVIDE PIN TO PIN RINGING | 24. QA REVIEW | 25. QA RETEST

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMB

27. REWORK BY | ORG | DATE | 28. RETESTED BY | ORG | DATE | 29. CONTINUATION ☐ SHEET USED

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: TEST EQUIPMENT CABLE HAD TWO TERMINATIONS REVERSED. ~~THESE WERE PREVIOUSLY REVERSED FOR A DESIRED TEST AND WERE NOT RESTORED TO ORIGINAL POSITIONS AFTER COMPLETION.~~ IF THIS WERE DISCOVERED PRIOR TO TWO HOURS AFTER TEST INITIATION, NO FAILURE REPORT WOULD BE REQUIRED. TEST PERSONNEL HAVE BEEN ADVISED TO

31. FRB CLOSURE: [signature] 5/27/82 | ☐ CONTINUATION SHEET USED

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION

34. BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☒ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET-UP ☐ MFG PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN | DEFECT CODE

35. FAILURE TYPE: ☒ PRIMARY ☐ INDUCED ☐ UNKNOWN ☐ NO FAILURE | 36. FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☒ MINOR ☐ SAFETY

37. RESPONSIBLE ENGINEER	ORG	DATE	38. SPACECRAFT SYSTEM ENGINEER	ORG	DATE
[signature]	2242	820528	[signature] for Siegel	5082	5/

39. RELIABILITY	ORG	DATE	40. CUSTOMER OR SUPPLIER	DATE
D. [illegible]	P-41	5-28-82	[illegible]	

HUGHES

HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

CONTINUATION SHEET

FR SERIAL NO. F5772

CONTINUATION SHEET LETTER

*LABEL FIRST CONTINUATION SHEET USED 'A', SECOND 'B', AND SO ON

IDENTIFY ENTRIES BY REFERENCING FR BLOCK NUMBER IN COLUMN. DATE EACH ENTRY.

ADDITIONAL FR CONTINUATION SHEET(S) USED ☐

30 RING CABLES OUT AS PART OF THEIR TROUBLESHOOTING MODE PRIOR TO INITIATING FAILURE REPORTS.

This is the first occurrence of subject discrepancy. In addition, contract quantities of subject test cables have been fabricated and no follow-on test cables are scheduled for fabrication. Therefore further corrective action will not be taken at this time. [signature] 6-17-82

ADDITIONAL CORRECTIVE ACTION HAS BEEN TAKEN VIA DDC No. PE 137:82, DATED 6/24/82. (COPY ATTACHED) [signature] 6/24/82

HUGHES

QUALITY CONTROL HISTORY RECORD

5772

CLA	ACCT DETAIL	PART NUMBER	PART SER NO	PART NAME	NEXT ASSY	PROJ/LT/MODEL	H R SER NO.
E330	GMB-131	3569497-11	092	CABLE W5036	—	H1236 ATG/PRG	ES 67093

ENGINEERING CHANGE DOCUMENTS	QTY.	WORK AUTHORIZATION NO	PLANNER/REQUESTER	SHEET
N/C REA	1	—	E.H. Sachtleben	1 OF 1

INSP BY	DATE	OPN NO	QUALITY HISTORY	DATE	ACC BY	INSP BY	DATE	OPN NO
	2/9/79	10	QA Screen Planning	10/2/79			11/2/79	70
	10/17/79	30	Disp. of Q.A. Rej Complete	2/1/79				
	2/6/79	70	Pending Journal release of Dwg 3569497 open Left Transferred to Incomplete status log	10/2/79				
			ORIGINAL PAGE IS OF POOR QUALITY				1/2/81	

QUALITY HISTORY	DATE	ACC BY
Final inspection Complete per REA Dwg 3569497-24 Rev HC Dwg no EO pending Journal release of Dwg 3569497 open Left Transferred to Incomplete status log		
INSPECTED FOR WORKMANSHIP, CONFIGURATION, AND CONTINUITY PER REV. A & E.O. 2627A (S1) 2/6/79		
MCI 2/6/81		
Hardware matches P/C of 81-70-50 and Rev A, EO 2627A, 2331A, 65631	2/6/81	
MCI per EO 2627A		
REPLACED CONNECTORS (BROKEN)		
CONT WORKMANSHIP. 3/30/81		
MCI 3/30/81		

HUGHES

QUALITY CONTROL HISTORY RECORD

5772

ES 67093

CLA	ACCT DETAIL	PART NUMBER	PART SER NO	PART NAME	NEXT ASSY	PROJECT/MODEL	M.R. SER. NO.
E330		3569497	002	5036		TM	ES ~~00000~~

REV / C $ NO	ENGINEERING CHANGE DOCUMENTS	QTY	WORK AUTHORIZATION NO	PLANNER/REQUESTER	SHEET
		1		CONNER	1 OF

INSP BY	DATE	OPN NO	QUALITY HISTORY	DATE	ACC BY	INSP BY	DATE	OPN NO	QUALITY HISTORY	DATE	ACC BY
			1						25		
	1/27/80	1/2	2 INSPECTION FOR WORKMANSHIP &						26		
			3 CONFIGURATION TO REA						27		
			4 RELEASE DWG, DATED						28		
			5 8/27/79. A.E. GUYOCE						29		
			6 IN G/S & SHIPPED TO S.B.						30		
			7 REFER TO ATTACHED QUALITY						31		
			8 HISTORY.			1/2	1/28/80		32		
			9						33		
			10 SEE ATTACHED MCI						34		
			11 NOTE:						35		
	1/29/80		12 S/N 002 W 5036 TO QC						36		
			13 INSTALLED IN BTSC #1 AS						37		
			14 TEMPORARY FIX (S/N 001 TO						38		
			15 BE REWORKED).						39		
			16						40		
			17						41		
			18						42		
			19						43		
			20						44		
			21						45		
			22						46		
			23						47		
			24						48		

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OPERATION INSTRUCTION SHEET A 5772

C/I NO _____ S/N 002

MODEL	CONTROL ITEM	NEXT ASSEMBLY	PART NAME	CHG. LTR.	PART NO.
			CABLE W5036	REA (—)	3569497-24

MATERIAL REQUIRED PER ONE PIECE (SEE KIT REQUISITION)

EFFECTIVE EO'S

WORK ORDER INFORMATION

MR/WO NO _____ CA NO E330-GMB-131

QA CONTRACT NO E330-JBB-N2

ORG CODE	PURE	ATT	TOTAL	ATT CD	INVENTORY CODE STORE	PROJECT	ACCT

QUALITY CONTROL SCREEN	START	ACCEPT.	PCS
OCIR NO ES 67093	10		

O.I.S. REVISIONS

REV. NO	REASON FOR REVISION	DATE	APPROVALS

PLANNER: E.H. SACHTLEBEN DATE: 1 OCT 79

OPN NO	REV NO	WORK STA	OPERATION INSTRUCTION	OPERATOR DATE	OPERATOR PR NO.	INSPECTOR DATE	INSPECTOR STAMP
10		46-32	Q/A Screen Planning			10/1/79	
20		45-26	Assemble Cable per Print. Leave crimped pins exposed for inspection.	10-17-79	31569		
30		46-32	Inspect pins for workmanship.			10/17/79	
40		USAF	MCI.			10/22/79	
50		45-26	Reassemble connector.	10-22-79	31569		
60		41-23	Wirecheck.	10-17-79	20162		
70		46-32	Final inspect completed cable for workmanship.				

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11/9/79 Rec'd 5119

1190A SC JUL 74

OPERATION INSTRUCTION
CONTINUATION SHEET

5172 Syst II

2 of 2

S/N 002

MODEL	CONTROL ITEM	NEXT ASSEMBLY	PART NAME	CHG. LTR.	PART NO.
			CABLE W5036		3569497-24

OPN NO	REV. NO	WORK STA.	OPERATION DESCRIPTION	MFG/ASSY AID	OPERATOR DATE	OPERATOR SIGN	INSPECTOR DATE	INSPECTOR APPROV.
80	(-72) -70	USAF	Final MCT.					
90			Box cable for shipment to Systems Area.					

5772

HUGHES QUALITY CONTROL HISTORY RECORD

GLA	ACC'T DETAIL	PART NUMBER	PART SER NO	PART NAME	NEXT ASSY	PROJECT/MODEL	H.R. SER NO
E330	GMB-131	3569497-24	002	CABLE W5036	—	HS 236 ENG/PRG	ES 67093

REV / C.S. NO	ENGINEERING CHANGE DOCUMENTS	QTY	WORK AUTHORIZATION NO	PLANNER/REQUESTER	SHEET
N/C REA		1	—	E.H. Sachtleben	1 OF 1

INSP BY	DATE	OPN NO		QUALITY HISTORY	DATE	ACC BY
[illegible]	9/7/79	10	1	QA Screen Planning	10/19/79	5119
			2			
			3			
			4			
			5			
			6			
	10/17/79	30	7	Insp. of op. #20 Complete	10/17/79	5113
			8			
			9			
			10			
			11			
	70		12			
TAG 5119	10/2/79	70	13	Pending formal release	10/29/79	[illegible]
			14	of Dwg 3569497		
			15	open Sqk transferred		
			16	to incomplete status log		
			17			
			18			
			19			
			20			
			21			
			22			
			23			
			24			

INSP BY	DATE	OPN NO		QUALITY HISTORY	DATE	ACC BY
5119	11/27/79	70	25	Final inspection Complete		
			26	for REA Dwg 3569497-		
			27	24 Rev N/C w/no EO		
			28	pending formal release		
			29	of Dwg 3569497 after		
			30	Sqk transferred to incomplete		
			31	status log		
			32			
			33			
	3/31/81		34	INSPECTED FOR WORKMANSHIP,		
			35	CONFIGURATION, AND CONTINUITY		
			36	PER REV. A & E.O. 2627A	3/31/81	[illegible]
			37			
			38	MCI	2/?/81	[illegible]
			39			
			40	Hardware matches P/C of	3/1/81	[illegible]
			41	8-20-80 and Rev A, EO 2627A,		
			42	2331A, 65631		
			43			
			44	MCI/ ~~ECO 9722 A~~	3/4/81	[illegible]
			45	REPLACED CONNECTORS (BROKEN)		
			46	CONT WORKMANSHIP. 3/30/81		
			47	MCI 3/30/81		[illegible]
			48			

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HUGHES

QUALITY CONTROL HISTORY RECORD

5772

10-1-80

ES 67093

GLA	ACCT DETAIL	PART NUMBER	PART SER NO	PART NAME	NEXT ASSY	PROJECT/MODEL	H R SER NO.
E330		3569497	002	W 5036		TM	ES ~~00000~~

REV / C S NO	ENGINEERING CHANGE DOCUMENTS	QTY	WORK AUTHORIZATION NO	PLANNER/REQUESTER	SHEET
		1		CONNER	1 OF

INSP BY	DATE	OPN NO	QUALITY HISTORY	DATE	ACC BY	INSP BY	DATE	OPN NO
			1					
	1/23/80	1 2cc	2 INSPECTED FOR WORKMANSHIP &					
			3 CONFIGURATION TO REA					
			4 RELEASE DWG, DATED					
			5 8/2/79. A.F. BUYOFF					
			6 IN G/S & SHIPPED TO S.B.					
			7 REFER TO ATTACHED QUALITY					
			8 HISTORY.			1 2	1/28/80	
			9					
			10 SEE ATTACHED MCI					
			11					
	1/29/80		12 S/N 002 W 5036 TO BE					
			13 INSTALLED IN BTSG #1 AS					
			14 TEMPORARY FIX (S/N 001 TO					
			15 BE REWORKED).					
			16					
			17					
			18					
			19					
			20					
			21					
			22					
			23					
			24					

QUALITY HISTORY	DATE	ACC BY
25		
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F. ⓓ 5772 S'XS, II 0 of 2

OPERATION INSTRUCTION SHEET A

E/I NO _____ S/N 002

MODEL	CONTROL ITEM	NEXT ASSEMBLY	PART NAME	CHG LTR.	PART NO.
			CABLE W6036	REA (–)	3569497-24

MATERIAL REQUIRED PER ONE PIECE (SEE KIT REQUISITION)

EFFECTIVE EO'S

WORK ORDER INFORMATION

MR/WO NO _____ CA NO E330-GMB-131

OA COST ACCT NO E330-JBB-N2

ORG CODE	PURE	ATT	TOTAL	ATT CD	INVENTORY CODE STORE	PROJECT	ACCT

QUALITY CONTROL SCREEN | START | ACCEPT. | PCS

QCIR NO ES67093 | 10 | | |

OIS REVISIONS

REV NO	REASON FOR REVISION	DATE	APPROVALS

PLANNER E.H. SACHTLEBEN DATE: 1 OCT 79

OPN NO	REV NO	WORK STA	OPERATION INSTRUCTION	OPERATOR DATE	OPERATOR PR NO.	INSPECTOR DATE	INSPECTOR STAMP
10		46-32	Q/A Screen Planning			10/1/79	
20		45-26	Assemble Cable per Print. Leave crimped pins exposed for inspection.	10-17-79	[illegible]		
30		46-32	Inspect pins for workmanship.			10/10/79	
40		USAF	MCI.			10/24/79	
50		45-26	Reassemble connector.	10-29-79	[illegible]		
60		41-23	Wire check.	10 12 79	[illegible] 20162		
70		46-32	Final inspect completed cable for workmanship.				

11/9/79 H.S. in Stg.

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(1 of 2)

OPERATION INSTRUCTION
CONTINUATION SHEET

STS SYST II

2 of 2

S/N 002

MODEL	CONTROL ITEM	NEXT ASSEMBLY	PART NAME	CHG. LTR.	PART NO.
			CABLE W5036		3369497-24

OPN NO	REV NO	WORK STA	OPERATION DESCRIPTION	MFG/ASSY AID	OPERATOR DATE	OPERATOR SIGN	INSPECTOR DATE	INSPECTOR APPROV.
80	(F2 F30)	USAF	Final MCE.					
90			Box cable for shipment to Systems Area.					

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SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

F 5778

ORIGINATION

1 PROGRAM NAME AND NUMBER	2. QTY	3. MODEL	4. ITEM DISCOVERED	5. DATE DISCOVERED
THEMATIC MAPPER H5236		F1	1407	MO JUNDA '8 YR 82

6. HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☑ SYSTEM ☐ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☐ MODULE ☐ MCAM ☐ CARD ☐ PART

EQUIPMENT IDENTIFICATION:	NAME	PART NUMBER	S/N	MANUFACTURER
7 SUBSYSTEM	TM ASSY	51065	003	
8 UNIT				
9 ☐ ASSEMBLY ☐ SUBASSEMBLY				
10 ☐ MODULE ☐ MCAM ☐ CARD				
11 OTHER				

12. TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ IN-PROCESS ☐ QUALIFICATION ☐ ACCEPTANCE ☐ INTEGRATION ☑ SYSTEM ☐ LAUNCH OPERATIONS ☐

13. ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☑ AMBIENT ☐ EMC/RI ☐ RADIATION ☐ VIBRATION ____ AXIS FOR ____ ☐ TEMP ____ ° ____ ☐ THERMAL VAC ____ ☐ MCN TYPE ____ HRS AT ____ ° ____ ☐ OTHER

14. DESCRIPTION OF FAILURE: Band 1 Video signals from detectors 8, 10, 11, 14, & 16 shows large offsets. (Band 4, Det 16 has same problems) in the dark. VIDEO collects.

15. TEST PROCEDURE	PARA	16. ORIGINATOR	ORG	DATE	17 CONTINUATION ☐ SHEET USED
TP32015-512		G. PLOWS	22-42	8206 15	

ENGINEERING EVALUATION

18. VERIFICATION AND FAILURE ANALYSIS: Removed A21 (B1) PWB; placed on extender & measured offsets which suggested open contacts at J35. Demated J35 & moved it over a little in its opening in Main Frame; then remated & tested. B1 good except for D11.

19. FAILED ITEM NAME AND PART NUMBER

20. ☑ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE: REMATE J-35 & CENTER CONNECTOR IN FRAME. RETEST

21 AUTHORIZATION	ORG	DATE	22 CONTINUATION ☐ SHEET USED

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: VIDEO CONFIRMS PROPER OUTPUT. OUTPUT IS O.K. ON ALL CHANNELS OF BAND 1 (B1)

24. OA ERROR: I / ITR

25. OA ASSIGNMENT: I / ITR

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER

27 REWORK BY	ORG	DATE	28. RETESTED BY	ORG	DATE	29. CONTINUATION ☐ SHEET USED

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: CONNECTOR TO BULKHEAD ASSEMBLY IS ALIGNED DUE TO LOCATION. TEST TECHNICIANS ARE AWARE OF THIS PROBLEM AND WILL TRY A REMATE PROCEDURE PRIOR TO REPORTING A FAILURE. THIS SHOULD PRECLUDE RECURRENCE OF THIS TEST PROCEDURE.

31. FRB CLOSURE: 7/20/82

31. CONTINUATION ☐ SHEET USED

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION

34. BASIC CAUSE OF VERIFIED FAILURE							DEFECT CODE
	☐ DESIGN	☐ TEST EQUIPMENT	☐ MFG PROCEDURE	☐ WORKING ERROR	☐ UNKNOWN		
	☐ ENVIRONMENTAL	☑ TEST PROCEDURE	☐ ASSY/FAB ERROR	☐ ROUGH HANDLING			
	☐ DEFECTIVE PARTS	☐ TEST SET-UP	☐ WORKMANSHIP	☐ WEAR-OUT			

33. FAILURE TYPE				35. FAILURE CLASSIFICATION			
	☑ PRIMARY	☐ UNKNOWN		☐ CRITICAL	☐ MINOR		
	☐ INDUCED	☐ NO FAILURE		☐ MAJOR	☐ SAFETY		

37 RESPONSIBLE ENGINEER	ORG	DATE	38 SPACECRAFT/SYSTEM ENGINEER	ORG	DATE
A. Perkins	22-42	7-15-82	R. Fleming	7241	7/20/82
39 RELIABILITY: C. Peterson	ORG 5141	DATE 7-15-82	40. CUSTOMER OR SUPPLIER		DATE

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EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

S 8101

ORIGINATOR

1. PROGRAM NAME AND NUMBER: PL1162 THEMATIC MAPPER | 2. GFA | 3. MODEL: F1 | 4. TIME OBSERVED: 1430 | 5. DATE OBSERVED: MO 3 DA 9 YR 82

6. HARDWARE LEVEL WHERE FAILURE WAS OBSERVED: ☐ SPACECRAFT ☐ SYSTEM ☒ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☐ MODULE ☐ MICAM ☐ CARD ☐ PART

EQUIPMENT IDENTIFICATION	NAME	PART NUMBER	S/N	MANUFACTURER
7. SUBSYSTEM	PARTIAL (EMC Mod & SMA) TM	51065	201	
8. UNIT				
9. ☐ ASSEMBLY ☐ SUBASSEMBLY				
10. ☐ MODULE ☐ MICAM ☐ CARD				
11. OTHER				

12. TEST WHERE FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ QUALIFICATION ☐ INTEGRATION ☐ LAUNCH OPERATIONS ☐ CO-PROCESS ☐ ACCEPTANCE ☐ SYSTEM ☒ Special (STRF005)

13. ENVIRONMENT WHERE FAILURE WAS OBSERVED: ☒ AMBIENT ☐ RADIATION ☐ TEMP ____ ° ____ ☐ THERMAL VAC ____ HRS AT ____ ° ____ ☐ ENCLOSED ☐ VIBRATION ____ AXIS PSD ____ HRS TYPE ____ ☐ OTHER

14. DESCRIPTION OF FAILURE: Partial system connected to the THEMATIC MAPPER ELECTRONIC MODULE TEST SET PN 79258. Attempts at turning system ON resulted

15. TEST PROCEDURE | PARA | 16. K Ziegler ORG 5320 DATE 3/10/82 | 17. CONTINUATION SHEET USED ☐

ENGINEERING EVALUATION

18. VERIFICATION AND FAILURE ANALYSIS: FAILURE WAS TRACED TO A SHORT CIRCUIT IN THE KEPS POWER SUPPLY. TWO WIRES WERE PINCHED BETWEEN THE COVER &

19. FAILED ITEM NAME AND PART NUMBER

20. ☒ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE

CLEAR SHORT CIRCUIT IN KEPS POWER SUPPLY.

21. AUTHORIZATION | ORG | DATE | 22. CONTINUATION SHEET USED ☐

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: PINCHED WIRES WERE MOVED TO PREVENT PINCHING. WIRES WERE TAPED TO PROVIDE GREATER INSULATION

24. QA WITNESS

25. QA WITNESS

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER
NONE						

27. REWORK BY: John Wills | ORG: 5320 | DATE: 4/5/82 | 28. RETESTED BY: John Wills | ORG: 5320 | DATE: 4/5/82 | 29. CONTINUATION SHEET USED ☐

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: CAUSED BY TEST EQUIPMENT FAILURE. TEST EQUIPMENT HAS BEEN REPAIRED.

31. CONTINUATION SHEET USED ☐

32. FAB CLOSURE: L Allmon 4-9-82

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION: None

34. BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☒ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET-UP ☐ MFG. PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN | DEFECT CODE

35. FAILURE TYPE: ☐ PRIMARY ☒ INDUCED ☐ UNKNOWN ☐ NO FAILURE | 36. FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☒ MINOR ☐ SAFETY

37. RESPONSIBLE ENGINEER: Current | ORG: 22-17 | DATE: 4/5/82 | 38. SPACECRAFT SYSTEM ENGINEER: [signature] | ORG: 2241 | DATE: 4/9/82

39. RELIABILITY: [signature] | ORG: 51-41 | DATE: 4-8-82 | CUSTOMER OR SUPPLIER: [signature] | DATE: 4/9/82

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SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

CONTINUATION SHEET

FR NUMBER: S-8101

CONTINUATION SHEET LETTER: A

*LABEL FIRST CONTINUATION SHEET USED 'A', SECOND 'B', AND SO ON

IDENTIFY ENTRIES BY REFERENCING FR BLOCK NUMBER IN COLUMN. DATE EACH ENTRY.

ADDITIONAL FR CONTINUATION SHEETS USED ☐

14	In blowing the circuit breaker in the Kepco power supply in the test set. Removal of connections of an oscilloscope cleared the problem and hardware seemed to function normally. The scope probes were grounded to breakout box connections at J20 pin 51 and J46 pin V1. On 3/9/82 12.65V was measured between these points. On 3/10/82 13.15 V was measured with wripoint positive with respect to spacecraft return. The voltage goes to 15/16 V when Kepco supply is ON and the radiometer is OFF. The source impedance is approximately 40 ohms.

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FAILURE REPORT

S 8127

ORIGINATOR

1. PROGRAM NAME AND NUMBER	2. GLA	3. MODEL	4. TIME OBSERVED	5. DATE OBSERVED
TM PL1162		PLT	1500	MO 4 DA 9 YR 82

6. HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☐ SYSTEM ☑ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☑ MODULE ☐ MICAM ☐ CARD ☐ PART

EQUIPMENT IDENTIFICATION:	NAME	PART NUMBER	S/N	MANUFACTURER
7. SUBSYSTEM	J24 EMI Filter	~~64646~~ 54578 rev	001	
8. UNIT				
9. ☐ ASSEMBLY ☐ SUBASSEMBLY				
10. ☐ MODULE ☐ MICAM ☐ CARD				
11. OTHER				

12. TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ IN-PROCESS ☐ QUALIFICATION ☐ ACCEPTANCE ☑ INTEGRATION ☐ SYSTEM ☐ LAUNCH OPERATIONS ☐

13. ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☑ AMBIENT ☐ EMC/RR ☐ RADIATION ☐ VIBRATION ☐ TEMP ____ ° ____ ☐ THERMAL VAC ____ HRS AT ____ ° ____ AXIS FOR ____ MIN TYPE ____ ☐ OTHER

14. DESCRIPTION OF FAILURE: No +/- 20 on +-18V on out put of cable 45061 and sabtrold limiters I were +-3 V instead of 22.V. The limiters started getting warm. Bypass diode 6 amps

15. TEST PROCEDURE: FLT 1 007 STR | PARA 5.11.6.8 5.11.7 | 16. ORIGINATOR: R Buckley | ORG 2242 | DATE 4-9-82 | 17. CONTINUATION ☐ SHEET USED

ENGINEERING EVALUATION

18. VERIFICATION AND FAILURE ANALYSIS: 4/12/82: Fault could not be repeated until cable was flexed. Then repeated short from power on tests led to discovery that a bad breakout box cable (No. 77329-22 in Roy B's office) caused the fault and NOT THE FILTER. The filters may have been overstressed.

19. FAILED ITEM NAME AND PART NUMBER: Breakout box cable 77329-22

20. ☒ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE: Determine where fault exists in cable. Explain where current flowed in filter and whether inductors, capacitors or diodes were overstressed. Fuses were not blown, as all capacitors check normal with C meter

21. AUTHORIZATION: Current | ORG 22-47 | DATE 4/12/82 | 22. CONTINUATION ☐ SHEET USED

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: CABLE CONNECTOR SHORT CIRCUITS IN CONNECTOR WERE REPAIRED. EMI FILTER WAS REBUILT USING NEW COMPONENTS AND RETESTED SUCCESSFULLY. REFERENCE REQUEST FOR INSPECTION / TEST NO. 340856 (COPY ATTACHED)

24. REWORK: I 7/8

25. RETEST: I 7/8

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER

27. REWORK BY | ORG | DATE | 28. RETESTED BY | ORG | DATE | 29. CONTINUATION ☐ SHEET USED

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: CAUSED BY FAILURE TO INSTALL INSERT IN CABLE CONNECTOR. CONNECTOR WAS REPAIRED. PROBABLE OVERSTRESS OF INDUCTOR LED TO A REPLACEMENT OF ALL ELECTRONIC COMPONENTS IN THE FILTER. THE TECHNICIANS HAVE BEEN ADVISED OF THIS DISCREPANCY AND CAUTIONED TO PREVENT A REOCCURENCE OF THIS PROBLEM.

31. CONTINUATION ☐ SHEET USED

33. FRB CLOSURE: 6/28/82

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION

34. BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☒ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET-UP ☐ MFG PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN | DEFECT CODE

35. FAILURE TYPE: ☒ PRIMARY ☐ INDUCED ☐ UNKNOWN ☐ NO FAILURE | 36. FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☒ MINOR ☐ SAFETY

37. RESPONSIBLE ENGINEER	ORG	DATE	38. SPACECRAFT SYSTEM ENGINEER	ORG	DATE
Evans For Neal Current		6-25-82		22-41	6/28/82
39. RELIABILITY	ORG	DATE	40. CUSTOMER OR SUPPLIER		DATE
	5141	6-25-82			

4/29/82

HUGHES

REQUEST FOR INSPECTION/TEST

(SEE REVERSE SIDE FOR COMPLETION INSTRUCTION)

No. 300856

1. DATE OF REQUEST: 4/20/82

2. TO: G.C. Benson DEPT. NO. 41-35 BLDG. S12 RM. C535 MS V329 EXT. 80879

3. FROM: L. O'Connell DEPT. NO. 51-41 BLDG. 11 RM. ____ MS 39 EXT. 6357

4. AUTHORIZED SIGNATURE: L. O'Connell

5. Project/Program: Thematic Mapper

6. GL A/Acct No.: F264-A15110000

7. P.O. No.: ____

8. R.R. No.: ____

9. Stock Xfr. No.: ____

10. Credit Req. No.: ____

11. Work Order No.: ____

12. NCMR No.: ____

13. Other: FR 58127

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14. INSTRUCTIONS:

Please perform the following Acceptance Tests per Para. 4.3 (Table 5) of TS 32015-034:

Table 5	54578 J24 Filter
Final Performance Test	5.2.5
Final Redundant Lead Test	5.2.3
Final Hi-Pot Test	5.2.4

Please return copy of test data sheets and this form to L. O'Connell, B11/MS 39.

15. ITEM	16. QTY	17. PART NUMBER	18. ACC	19. SUSP	20. DATE	21. INSP. STAMP/ ENG'R SIGNATURE	22. HOURS CHARGED	23. COMMENTS–SPECIFY REASONS FOR NON-ACCEPTANCE
1	1	54578	X		4/21/82	G. Benson (HAC TEST S3)		PERFORMANCE DATA ATTACHED AND ACCEPTABLE.
		S/N 001						

7/8 C3 DCC 71

Yellow" copy held by originator pending

HUGHES

QUALITY CONTROL HISTORY RECORD (CONTINUATION SHEET)

GIA 1	PART NUMBER 3	PART SER NO 4	SHEET 11 OF	H A SER NO 20
F261	54578	001		

INSP 14 BY	DATE 15	OPN 16 NO	QUALITY HISTORY	DATE 18	ACC 19 BY	INSP 14 BY	DATE 15	OPN 16 NO
	4/1/84	/	1 QC INSP FILTER ASSY (INCOMING)	4/1/84	HAC IP 115			
			2 PROOF TO TEST NO DAMAGE NOTED	EL				
			3					
			4					
HAC TEST 532	APR 22 1984		5 Completed final performance	APR 22 1984	HAC TEST 532			
			6 acceptance tests per TS					
			7 32615-034 Rev. N/C. Para. 4.3					
			8 (Table 5). Reviewed and accepted					
			9 test data.					
			10					
			11					
			12					
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			14					
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			27					

QUALITY HISTORY 17	DATE 18	ACC 19 BY
28		
29		
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8127

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J24 FILTER (54578)

10.2.2 Redundant Lead Test Data

8127

S/N: 1

Testing Phase: FINAL REDUNDANT LEAD

Verify with a check that the red "LED" comes on with each function below:

Para.	Switch	Positions	Verify
5.2.3.1	S5	S6	
	-1	-1	✓ (Check)
	-2	-2	✓ (Check)
	-3	-3	✓ (Check)
	-3	-4	✓ (Check)
	-3	-5	✓ (Check)
	-4	-6	✓ (Check)
	-5	-7	✓ (Check)
	-5	-8	✓ (Check)
	-5	-9	✓ (Check)

Tester(s)

4/21/82
Date

J24 FILTER (54578) 8127

10.2.3 Hi-pot Test Data

S/N: 1

Testing Phase: FINAL HIGH POT

REF. PARA	DESCRIPTION	LIMITS	MEASUREMENT
5.2.4.2	Resistance	Shall be >1M Ω	20MΩ
5.2.4.3	Resistance	Shall be >1M Ω	5MΩ

Tester(s)

4/21/82
Date

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TS 32015-034
Rev. -
16 November 1981

8127

HAC TEST S32

APR 23 1982

J24 FILTER (54578)

16.2.4 Capacitor Test Data

S/N: 1 Temperature: AMB

Testing Phase: FINAL PERFORMANCE

REF. PARA	DESCRIPTION	LIMITS	MEASUREMENT
5.2.5.1.2	Capacitance Measurement	7 ± 2 uF	7 uF
5.2.5.1.3	Capacitance Measurement	7 ± 2 uF	7 uF

Tester(s)

4/21/82
Date

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TS 32015-034
Rev. -
16 November 1981

HAC TEST S32

8127

APR 23 1982

J24 FILTER (54578)

10.2.5 Diode Test Data

S/N: 1 Temperature: AMB

Testing Phase: FINAL PERFORMANCE TEST

REF. PARA.	DESCRIPTION	LIMITS	MEASUREMENT
5.2.5.2.2	Diode Voltage Drop	1.7 (+.2 -.3)V	1.7 V
5.2.5.2.3	Diode Voltage Drop	1.7 (+.2 -.3)V	1.7 V

Tester(s)

4/21/82
Date

8127

J24 FILTER (54578)

10.2.6 Inductor Test Data

S/N: 1 Temperature: AMB

Testing Phase: FINAL PERFORMANCE

REF. PARA.	DESCRIPTION	LIMITS	MEASUREMENT
5.2.5.3.2	Resonance Measurement $\frac{1}{T} = f$	1800 ± 400 Hz (455uSec < T < 714uSec)	1923 Hz 520 usec
5.2.5.3.3	Resonance Measurement $\frac{1}{T} = f$	1800 ± 400 Hz (455uSec < T < 714uSec)	2000 Hz 500usec

G Stuffelbeam GS
Tester(s)

4/21/82
Date

8127

J24 FILTER (54578)

10.2.7 Attenuation Characteristics Test Data

S/N: 1 Temperature: AMB

Testing Phase: FINAL PERFORMANCE

REF. PARA.	DESCRIPTION	LIMITS	MEASUREMENT
5.2.5.4.1	Record Voltage for Following Frequencies		
	100 Hz	1.0 ± .1V P-P	1.0 V P-P
	450 Hz	1.0 ± .3V P-P	1.1 V P-P
	6.3 KHz	.1 ± .05V P-P	.09 V P-P
	20 KHz	10mV ± 3mV mV P-P	10 mV P-P

Tester(s) 4/21/82 Date

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: F.R. Phillips

CC: Distribution

DATE: 26 April 1982

REF: HS 236-7956
PE 96:82

FROM: L. O'Connell

SUBJECT: EMI Filter
(P/N 54585 S/N 001)

8127

BLDG. B-11 MAIL STA. 39
EXT. 6357

Subject Filter was subjected to extreme internal temperatures during the running of STR FLT 1 007 as the result of a short circuit in a breakout cable (This anomaly was reported on FR S8127, copy attached).

This office has investigated the problem to determine what effect the overheating has on the long term Reliability of the filter. The results of this study are documented in IDC's PE 86:82 and PE 88:82 (copies attached).

In addition to the above investigation, the undersigned has discussed the problem with G. Benson (Power Supply REA) and he recommended that all of the components be removed and replaced because the excessive heat degraded the Reliability of the components.

CONCLUSIONS

Based on the Thermal Analysis conducted by Reliability, the opinions of the REA (G. Benson) and the undersigned, it has been concluded that the internal components of subject filter have been overstressed and their longevity is suspect. Even though the filter passed re-test, the ability of the device to perform over an extended period of time is too uncertain to warrant certification as Flight hardware.

RECOMMENDATIONS

The following options are offered for your consideration:

1. Use EMI Filter (S/N 001) for test purposes only while a new EMI filter is being fabricated at El Segundo.

2. Rework EMI Filter (S/N 001) by removing and replacing all components.

L. O'Connell
Reliability Manager
Thematic Mapper Program

LOC:jc

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: L. O'Connell CC:

DATE: 16 April 1982
REF: PE 88:82

SUBJECT: Reliability Analysis of Discrepancy recorded on Failure Report S8127 8127

FROM: A. Perline
BLDG. B-11 MAIL STA.39
EXT. 6106

Reference: 1. Internal Memo PE 86:82 of 13 April 1982
2. HS 236-7783
3. Failure Report S8127

Subject Failure Report was reviewed from a Reliability viewpoint to provide an estimate of the effects of overheating that occurred at the time of the failure. The manufacturer of the inductor was contacted and he advised me that 21 gage HP magnet wire could withstand a 200°C temperature for a very short period and that 170°C was its maximum operating temperature.

These temperature constraints agree closely with the estimated 180°C operating temperature for 30,000 hours of life quoted by SBRC materials personnel.

The analysis in reference 1 is repeated in attachment 1 to this memo. It shows that the inductor temperature will reach at least 260° C.

Another approach is presented in attachment 2 as a crosscheck. The calculations show that temperature at the inductor will exceed 266°C.

Loss of the inductor to an open circuit would impose a loss of SMA heater function A short circuit would degrade the low frequency filtering capability of the unit.

Considering the fact that the wire should not be subjected to temperatures above 200°C, it is my position that the Reliability of this unit has been degraded and the filter should not be used in the Flight Unit.

A. Perline

AP:jc

TEMPERATURE CALCULATIONS FOR J-26 FILTER INDUCTOR

8127

Current through Inductor	6 Amps
Inductor Resistance	.360 ohms
Temperature rise (from HS 236-7783)	18° C/W

Power Dissipated:

$I^2R = (6^2)\ (.360) = 12.96$

Temperature Change:

Power X Temperature Rise = (12.96) (18) = 233°C

Inductor Temperature:

Ambient + Temperature Change = 28°C + 233°C = 261°C Inductor Temperature

8127

ALTERNATE TEMPERATURE CALCULATIONS FOR J24 FILTER INDUCTOR

Current Through Inductor (I)	6 Amps
Inductor Resistance (R)	.360 ohms
Coefficient of Thermal Conductivity of Foamed Urethane (k)	$\frac{6\ (10^{-3})W}{CM\ ^{\circ}C}$
Theoretical donut surrounding inductor	1.9 cm I.D.X. 3.81 cm O.D. X 2.54 cm Thick

Conductivity:

$$C = \frac{2\pi k t}{\ln (r_2/r_1)} = 0.544$$

$$\Delta T = \frac{Q}{C}$$

$$\Delta T = \frac{12.96}{.0544} = 238^{\circ}$$

Inductor Temperature: Ambient + Temperature Change = $28^{\circ}C + 238^{\circ}C = 266^{\circ}C$

Where: r_2 is the O.D.

r_1 is the I.D.

t is the thickness

$Q = I^2R = 12.96$

ΔT = Temperature change

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HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

S 8134

1. PROGRAM NAME AND NUMBER	2. GLA	3. MODEL	4. TIME OBSERVED	5. DATE OBSERVED
THEMATIC MAPPER-V415		FLIGHT	1100	MO 5 DA 5 YR 82

6. HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☐ SYSTEM ☒ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☐ MODULE ☐ MCAM ☐ CARD ☐ PART

ORIGINATOR

EQUIPMENT IDENTIFICATION:	NAME	PART NUMBER	S/N	MANUFACTURER
7. SUBSYSTEM	THEMATIC MAPPER	51065	003	SBRC
8. UNIT				
9. ☐ ASSEMBLY ☐ SUBASSEMBLY				
10. ☐ MODULE ☐ MCAM ☐ CARD				
11. OTHER				

12. TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ IN-PROCESS ☐ QUALIFICATION ☐ ACCEPTANCE ☒ INTEGRATION ☐ SYSTEM ☐ LAUNCH OPERATIONS ☐

13. ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☒ AMBIENT ☐ EMC/RFI ☐ RADIATION ☐ VIBRATION ☐ TEMP ___ ° ___ ☐ THERMAL VAC ___ HRS AT ___ ° ___ AXIS FOR ___ MFR TYPE ___ ☐ OTHER

14. DESCRIPTION OF FAILURE: SMA HEATER & SUNSHADE SENSOR CABLE HARNESS IMPEDANCE MEASUREMENT - TDR AT P22 PIN 1 to PIN 5 IS OPEN S/B 31 Ω, PIN 34 to PIN 36 IS 13.9 Ω S/B 25 Ω

15. TEST PROCEDURE	PARA	16. ORIGINATOR	ORG	DATE	17. CONTINUATION ☐ SHEET USED
AHP 0061 2450		F. SAUCIER	22-74	820505	

ENGINEERING EVALUATION

18. VERIFICATION AND FAILURE ANALYSIS: VISUAL INSPECTION REVEALED SMA-2 SAFEHOLD HEATER (1") WIRED TO IMPROPER TERMINALS ON TBSUI-1. Fault observed explains all anomalous readings recorded on the data sheet. Unit wired to terminals 3 & 4, which put it in parallel with the SMA #3 heater.

19. FAILED ITEM NAME AND PART NUMBER: N/A

20. ☒ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE: REWORK SMA-2 SAFEHOLD HEATER (1") TO PRINT

21. AUTHORIZATION	ORG	DATE	22. CONTINUATION ☐ SHEET USED
Current	22-17	5/5/82	

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: REWORKED SMA-2 SAFEHOLD HEATER (1") to PRINT. PERFORMED CONTINUITY TEST AND VERIFIED PROPER TERMINATIONS

24. QA INSPECTOR

25. QC INSPECTOR

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER
NONE						

27. REWORKED BY	ORG	DATE	28. RETESTED BY	ORG	DATE	29. CONTINUATION ☐ SHEET USED
L JONES	22-74	5-6-82	ED KALMAN	22-42	5-6-82	

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: CAUSED BY WIRING ERROR. NO OVERSTRESS OF PARTS OCCURRED. AS TEST IS AN UNPOWERED PROCEDURE USING AN OHMMETER ASSEMBLY TECHNICIANS HAVE BEEN ADVISED OF DISCREPANCY, AND THEY HAVE BEEN CAUTIONED AGAINST REPETITION.

31. ☐ CONTINUATION SHEET USED

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION

33. FRB CLOSURE: 5/10/82

34. BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☐ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET UP ☐ MFG PROCEDURE ☒ ASSY/FAB ERROR ☐ WORKMANSHIP ☒ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN

DEFECT CODE

35. FAILURE TYPE: ☒ PRIMARY ☐ INDUCED ☐ UNKNOWN ☐ NO FAILURE

36. FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☒ MINOR ☐ SAFETY

37. RESPONSIBLE ENGINEER	ORG	DATE	38. SPACECRAFT SYSTEM ENGINEER	ORG	DATE
Current	22-17	5/7/82		2241	5/10/82

TEST EQUIPMENT

Failure Reports

Closed	Open
F0553	None
F0555	
F1325	
F1329	
F1748	
F2662	
F2664	
F4253	
F4256	
S8101	
S8206	
S8328	
S8371	
S8378	
S8443	

Deviations

D-160

Waivers

None

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR -481 FOR INSTRUCTIONS)

DATE PREPARED: 07-08-82

PROCURING ACTIVITY NO:

1 ORIGINATOR NAME AND ADDRESS: SBRC
75 Coromar Drive
Goleta, CA 93117

2 [X] DEVIATION [ ] WAIVER

3 [X] MINOR [ ] MAJOR [ ] CRITICAL

4 DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS DESIG.	d. DEV/WAIVER NO
TM Calibrator	11323	TM	D-160

5 BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6 OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7 SPECIFICATIONS AFFECTED-TEST PLAN

	MFR CODE	SPEC/DOC. NO	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN			

8 DRAWINGS AFFECTED

MFR CODE	NUMBER	REV	MOD. NO.
11323	72611	D	

9 TITLE OF DEVIATION/WAIVER: T.M. CALIBRATOR ASSEMBLY--SHIM RETICLE, SPACER RETAINER

10 CONTRACT NO. & LINE ITEM: NAS-5-24200

11 CONFIGURATION ITEM NOMENCLATURE: T.M. CALIBRATOR ASSEMBLY

CLASSIFICATION OF DEFECT

12 CD NO: II

13 DEFECT NO:

14 DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15 NAME OF ITEM ASSEMBLY AFFECTED	16 DWG NO. OR TYPE DESIG.	17. LOT NO	18 QTY
SPACER, RETAINER	SK10779		8 ea
SHIM, RETICLE	SK10793		2 ea

19 RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20 EFFECT ON COST/PRICE: NONE

72611-D

21 EFFECT ON DELIVERY SCHEDULE:

22 EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.: NONE

23 DESCRIPTION OF DEVIATION/WAIVER

USE OF NON-RELEASE DRAWING FOR FABRICATING THE FOLLOWING ITEMS:

1) SK10779 SPACER, RETAINER 8 ea.
2) SK10793 SHIM, RETICLE 2 ea.

NOTE: ITEMS 1 AND 2 TO BE USED DURING THERMAL VACUUM TESTING. SHIMS AND SPACERS TO BE REMOVED PRIOR TO DELIVERING CALIBRATOR.

24 NEED FOR DEVIATION/WAIVER

THE ABOVE ITEMS WILL BE USED ON THE T.M. CALIBRATOR. THIS DEVIATION WILL AUTHORIZE ITS USE WITHOUT RELEASE DRAWINGS. ASSEMBLY OF THE ITEMS WILL BE INCORPORATED BY FORMAL SUPPLEMENTAL PLANNING AGAINST THE T.M. CALIBRATOR SERNO 002, P/N 72611.

REA W. Balinski SYS ENGR J.P. Engel

QA 7-12-82

PE 7/15/82

CMO 7/15/82

25 PRODUCTION EFFECTIVITY BY SERIAL NUMBER: 72611 SERNO 002 ONLY

26 SIGNATURE: J.P. Engel

TITLE: Minor - System Engineering
Major/Critical - Program Manager

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [ ] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY

SIGNATURE DATE

DD FORM 1694

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EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

S 8371

ORIGINATOR

1. PROGRAM NAME AND NUMBER	2. GLA	3. MODEL	4. TIME OBSERVED	5. DATE OBSERVED
TM PL 1162	V414	FLT	2:30	MO 4 DA 7 YR 82

6. HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☐ SUBSYSTEM ☐ ASSEMBLY ☐ MODULE ☐ CARD ☐ SYSTEM ☐ UNIT ☑ SUBASSEMBLY ☐ MICAM ☐ PART

EQUIPMENT IDENTIFICATION	NAME	PART NUMBER	S/N	MANUFACTURER
7 SUBSYSTEM				
8 UNIT				
9 ☐ ASSEMBLY ☑ SUBASSEMBLY	53650 Cable	53650		SBRC
10 ☐ MODULE ☐ MICAM ☐ CARD				
11 OTHER				

12. TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ QUALIFICATION ☑ INTEGRATION ☐ LAUNCH OPERATIONS ☐ IN-PROCESS ☐ ACCEPTANCE ☐ SYSTEM ☐

13. ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☑ AMBIENT ☐ RADIATION ☐ TEMP ____ ° ____ ☐ THERMAL VAC ____ HRS AT ____ ° ____ ☐ EMC/RFI ☐ VIBRATION ____ AXIS FOR ____ MIN TYPE ____ ☐ OTHER

14. DESCRIPTION OF FAILURE: Inchworm would NOT respond To Move Command

15. TEST PROCEDURE: Apogy optics AHR Sop. 15 | LOCAL OPER: No 400 | 16. ORIGINATOR: L Evans | ORG: 22-13 | DATE: 4/7/82 | 17. CONTINUATION ☐ SHEET USED

ENGINEERING EVALUATION

18. VERIFICATION AND FAILURE ANALYSIS: Found problem To be in wearsaver, wearsaver removed

19. FAILED ITEM NAME AND PART NUMBER: Wearsaver 76440-3

20. ☐ FOLLOWING REWORK/RETEST REQUIRED ☐ REWORK/RETEST NOT REQUIRED BECAUSE: ReTest with wearsaver OUT

21. AUTHORIZATION: L Evans | ORG: 22-13 | DATE: 4/8/82 | 22. CONTINUATION ☐ SHEET USED

MANUFACTURING AND TEST

23. REWORK/RETEST ACTION TAKEN: ReTested with wearsaver out, Tested OK, Red Tagged wearsaver & sent for repair

24. REWORK

25. QA RETEST

26. LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER

27. REWORK BY | ORG | DATE

28. RETESTED BY: L Evans | ORG: 22-13 | DATE: 4/8/82 | 29. CONTINUATION ☐ SHEET USED

ENGINEERING/RELIABILITY

30. CAUSE AND CORRECTIVE ACTION: TEST EQUIPMENT DISCREPANCY - WEAR SAVER IN QUESTION WAS RED TAGGED AND WILL NOT BE USED UNTIL REPAIRED AND INSPECTED.

31. FRB CLOSURE: 4-9-82

31. ☐ CONTINUATION ☐ SHEET USED

32. DOCUMENT IMPLEMENTING CORRECTIVE ACTION

34. BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☑ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET UP ☐ MFG PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN | DEFECT CODE

35. FAILURE TYPE: ☐ PRIMARY ☑ INDUCED ☐ UNKNOWN ☐ NO FAILURE

36. FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☐ MINOR ☐ SAFETY

37. RESPONSIBLE ENGINEER: W Balinski | ORG: 22-35 | DATE: 82-4-8

38. SPACECRAFT SYSTEM ENGINEER: [signature] | ORG: 2241 | DATE: 4/9/82

39. RELIABILITY | ORG: 111 | DATE: 11-0 4/9

40. VENDOR OR SUPPLIER | DATE

4.2 REQUESTS FOR DEVIATION/WAIVER

The following pages list the Requests for Deviation or Requests for Waiver submitted for the Flight Model Thematic Mapper, by number, description, and current status.

Copies of Requests for Deviation/Waiver that were submitted for particular subsystems are included in the Appropriate subsection of Volume II of this report. Copies of Requests for Deviation/Waiver submitted against the instrument are included herein.

DEVIATION NUMBER	DESCRIPTION	STATUS
D-128 Procedure	Authorization to modify wire bond connection	Approved
D-129 Drawing	Use of alternate terminal Assy.	Approved
D-130 Hardware/Procedure	Alternate Comp. Placement	Approved
D-131 Hardware/Procedure	Alternate Comp. Placement	Approved
D-133 Hardware/Drawing	Alternate wiring, Cal Shutter Back	Approved
D-134 Procedure	Redundant Shutter Cable Support Pin	Approved
D-135 Procedure/Hardware	Alternate wiring - PostAmp Band 3	Approved
D-136 Hardware/Procedure/ Drawing	Band -6, Voltage Regulator, series Resistor Change.	Approved
D-137 Procedure/Hardware Drawing	Cal Shutter Backup - Timing Jitter Correction	Approved
D-138 Procedure	Documentation Deficiency of Telescope Thermistores.	Approved
D-139 Procedure	Spliced Inchworm Leads - Reylay Optics	Cancelled
D-141 (Spare) Procedure/Hardware	Permission to use Cooler cables of Previous Design	Approved

DEVIATION NUMBER	DESCRIPTION	STATUS
D-142 (SPARE) PROCEDURE/HARDWARE	PERMISSION TO USE AG EPOXY BONDS	APPROVED
D-143 PROCEDURE	TM CONFIGURATION FOR STARTING IA-07 TEST	APPROVED
D-144 PROCEDURE	TEST WITH OPEN 208 KHZ SYNC LINES	APPROVED
D-145 PROCEDURE	EMI TEST TEST DELETIONS	PENDING
D-146 PROCEDURE	TM CONFIGURATION FOR STARTING IA-07 TEST	APPROVED
D-147 HARDWARE/PROCEDURE	SOLDERING OF TWO RESISTORS TO R130 PADS	APPROVED
D-148 PROCEDURE	PERMISSION TO USE EM TM 32015-618 INSTEAD OF TP 32015-626 FOR MASS PROPERTIES DETERMINATION	PENDING
D-150 HARDWARE/ PROCEDURE/ DRAWING	ALTERNATE WIRING	APPROVED
D-154 PROCEDURE	USE OPTIONAL AC07 TEST CONFIGURATION FOR AC07 TESTING.	APPROVED
D-155 PROCEDURE	USE BAND 4 DETECTOR 7 TO CONDUCT IA04 TEST	APPROVED
D-156 PROCEDURE	CALCULATE BAND 6 IGFOVS FROM COMPONENT LEVEL SPOT SCAN MEASUREMENTS	APPROVED

DEVIATION NUMBER		DESCRIPTION	STATUS
D-157	PROCEDURE	USE OF MOTOR FROM UNCONTROLLED STORAGE	PENDING
D-158	PROCEDURE	EMI/EMC TESTS DELTION	APPROVED
D-159	DRAWING/HARDWARE/ PROCEDURAL	ALTERNATE WIRING	APPROVED
D-160	PROCEDURAL	USE OF NON-RELEASE DRAWING FOR FABRICATING THE FOLLOWING ITEMS: 1) SK10779 SPACER, RETAINER 2) SK10793 SHIM, RETICLE	APPROVED 8 EA 2 EA
D-161	PROCEDURAL	ALLOW DEVIATION FROM FLIGHT CONFIGURATION FOR AC02. AC22 + S-T: F1-015.	APPROVED
D-162	PROCEDURAL	CONTINUE AC TESTS AND DO BL TESTS WITH PARTIAL TM CONFIGURATION.	APPROVED
D-163	PROCEDURAL	MANUAL OPERATION OF CALIBRATOR CONTROL CONSOLE (CCC)	APPROVED
D-164	PROCEDURAL	MANUAL OPERATION OF CALIBRATOR CONTROL CONSOLE (CCC).	APPROVED
D-165	PROCEDUAL	PERMISSION TO PERFORM BL07, BL12, BL16 AND BL19/20 TESTS WITH PARTIAL TM CONFIGURATION.	APPROVED

SUMMARIZE AS OF 7-26-82

WAIVER NUMBER	DESCRIPTION	STATUS
W109 HARDWARE	PERMISSION TO ASSEMBLE B7 DETECTOR WITH DISCREPANT BAND 5 DETECTOR.	APPROVED
W110 HARDWARE	PERMISSION TO TEST AND REPAIR DISCREPANT BAND 7 DETECTOR.	APPROVED
W111 HARDWARE	PERMISSION TO CONTINUE DISCREPANT BAND 5 & 7 DETECTORS.	APPROVED
W112 HARDWARE	PERMISSION TO CONTINUE THRU FPA ASSY. 50795 W/BAND 3, CH 9 WIDE BAND NOISE OF 2.9 PA.	APPROVED
W113 HARDWARE	PERMISSION TO USE NONCONFORMING INSB DETECTORS.	APPROVED
W114 HARDWARE	PERMISSION TO PROCEED W/BAND 4 CH 21 NOISE OF 2.8 PA.	APPROVED
W115 PROCEDURE/ HARDWARE	PERMISSION TO USE BAND 2 BAND LEVEL ASSY. S/N 401.	APPROVED
W116 HARDWARE/ PROCEDURE	PERMISSION TO USE BAND 3 BAND LEVEL ASSY. S/N 201.	APPROVED
W117 HARDWARE/ PROCEDURE	PERMISSION TO USE BAND 4 BAND LEVEL ASSY. S/N 201.	APPROVED

WAIVER NUMBER	DESCRIPTION	STATUS
W118 HARDWARE/PROCEDURE	PERMISSION TO USE PFPA W/BAND AND CH. 16 NOISE OF 2.8 pA.	APPROVED
W119 HARDWARE/PROCEDURE	PERMISSION TO USE HALF-BAND 207-1	APPROVED
W120 HARDWARE/PROCEDURE	PERMISSION TO USE BAND 4 POSTAMP S/N 201.	APPROVED
W121 HARDWARE/PROCEDURE (SCAN MIRROR)	TO RUNAROUND TIME EXCEEDS SPECIFICATION.	APPROVED
W122 PROCEDURE	PERMISSION TO REPAIR BAND 7 INSB DETECTOR.	APPROVED
W123 PROCEDURE	PERMISSION TO USE BAND 1 BAND LEVEL ASSY. S/N 401	APPROVED
W124 HARDWARE/ PROCEDURE	MINOR PERFORMANCE DISCREPANCIES S/N 003 MUX	APPROVED
W125 HARDWARE (MULTIPLEXER)	BROKEN SCREW IN ONE MUX MOUNTING HOLE.	APPROVED
W126 HARDWARE	PERMISSION TO USE PFPA W/BAND 1 MISALIGNMENT	APPROVED
W129	HARDWARE TELESCOPE HOUSING. BLACK PAINT FLAKING.	CANCELLED

WAIVER NUMBER	DESCRIPTION	STATUS
W130 (SPARE) HARDWARE	PERMISSION TO USE SPARE CFPA WITH DAMAGED TRACES.	APPROVED
W132 HARDWARE	PERMISSION TO USE INSB DETECTOR ARRAYS	APPROVED
W133 HARDWARE	PERMISSION TO USE NON-CONFORMING INSB DETECTORS.	APPROVED
W134 HARDWARE	PERMISSION TO USE LFPA W/VOID IN CIRCUIT TRACE.	APPROVED
W135 HARDWARE/ PROCEDURE	PERMISSION TO USE FLCFPA W/DISC REP PER FR 8208.	APPROVED
W136 HARDWARE/ PROCEDURE	LOW VALUE FOR TELESCOPE MTF	APPROVED
W137 PROCEDURE/ HARDWARE	REFLECTANCE OF TELESCOPE OPTICS	APPROVED
W138 HARDWARE/PROCEDURE (PF/FL)	STRESS LEVEL OF PULSE-WIDTH MODULATOR (90997-2)	APPROVED
W139 HARD' \RE	SOLITHANE CONFORMAL COATING	APPROVED
W140 PROCEDURE	MISSING PLANNING FOR 51787 THERMISTOR BLACK ASSY.	APPROVED

WAIVER NUMBER	DESCRIPTION	STATUS
W141 PROCEDURE	MISSING PLANNING FOR SCREW TRIM OPERATION.	APPROVED
W142 HARDWARE/ PROCEDURE	PERMISSION TO USE F-J CFPA WITH DISCREPANT SUBSTRATE	APPROVED
W143 PROCEDURE	NO PLANNING FOR EO 8842 - BAFFLE ASSY.	APPROVED
W144 PROCEDURE	DEVIATION FOR RADIATIVE COOLER TEST PLAN	APPROVED
W145 PROCEDURE	WAIVER FOR IA01R TEST PROCEDURE	APPROVED
W146 PROCEDURE (PF-F-S)	PERMISSION TO USE HCT DETECTORS MADE WITHOUT RELEASE PLANNING.	APPROVED
W-147 PROCEDURE	DEVIATION FROM RAD COOLER TEST PLAN	APPROVED
W-148 PROCEDURE	WAIVER ON TOLERANCE OF PFP TO SCAN DIRECTION ALIGNMENT.	APPROVED
W-149 HARDWARE	WAIVER FOR RADIATIVE COOLER CIRCUIT DIAGRAM.	APPROVED
W-150 PROCEDURE/HARDWARE	SPLICE EBTCE CABLES	APPROVED
W-151 PROCEDURE	PERMISSION TO SHORTEN TEMPERATURE CONTROL TEST	APPROVED

WAIVER NUMBER	DESCRIPTION	STATUS
W-152 (SPARE) HARDWARE	PERMISSION TO USE NON-CONFORMING InSb DETECTORS.	APPROVED
W-153 (SPARE) PROCEDURE/ HARDWARE	PERMISSION TO USE InSb DETECTORS FROM LOT 24 WAFER 21.	PENDING
W-154 (SPARE) HARDWARE/PROCEDURE	PERMISSION TO USE BAND LEVEL ASSY. S/N 501-?	PENDING
W-155 (SPARE) HARDWARE/PROCEDURE	PERMISSION TO USE BAND LEVEL ASSY S/N 501-1	PENDING
W-156 HARDWARE	TERMINAL BOARD TO REPLACE SPLICED COOLER DOOR MOTOR LEAD	APPROVED
W-157 (SPARE) HARDWARE/PROCEDURE	PERMISSION TO USE HALF BAND S/N 211-1	PENDING
W-158 (SPARE) HARDWARE/PROCEDURE	PERMISSION TO USE HALF BAND S/N 101-1	PENDING
W-160	PERFORM AC-2 TEST UTILIZING UNDOCUMENTED TELEMETRY SYNCHRONIZER.	APPROVED

WAIVER NUMBER	DESCRIPTION	STATUS
W-161 HARDWARE	PERMISSION TO USE CFPA WITH A BAND 5 DETECTOR THAT DOES NOT MEET SYSTEM SPECTRAL FLATNESS SPECIFICATION.	PENDING
W-162 HARDWARE	PERMISSION TO PROCEED WITH F-1 SYSTEM BAND 5 TO BAND 7 REGISTRATION.	PENDING
W-163 HARDWARE	PERMISSION TO USE CFPA WITH FET OFFSETS >10MV BAND -7 CH 7+15.	PENDING
W-164 PROCEDURAL	PERMISSION TO USE SPARE CFPA WITHOUT PERFORMING NON-DESTRUCTIVE PULL TEST.	PENDING
W-165 HARDWARE	PERMISSION TO USE AS-IS WITH FOLLOWING DISCREPANCIES: THE SPECTRAL MATCHING VARIATION BETWEEN CHANNELS IS A MAXIMUM OF .065% IN BAND 1+1.07% IN BAND 4.	PENDING
W-166 PROCEDURAL	A WAIVER IS REQUESTED TO DELETE CS06 PORTION OF EMI/EMC TESTS. SUMMARIZE AS OF 7-23-82.	APPROVED

ADDENDUM FOR PRE-SHIPMENT REVIEW

WAIVER NUMBER	DESCRIPTION	STATUS
W167 HARDWARE/PROCEDURE	PERMISSION TO CUT TRACES AND USE ALTERNATE WIRING TO INSTALL 16 RESISTORS.	APPROVED
W168 HARDWARE	PERMISSION TO USE BAND 5, CHANNEL 7 WITH COHERENT NOISE.	APPROVED
W169 HARDWARE	PERMISSION TO USE BANDS 1 AND 4 WITH SPECTRAL MATCHING VARIATIONS GREATER THAN 0.5%.	APPROVED
W170 HARDWARE	PERMISSION TO USE BANDS 1 AND 4 WITH IFOV SIZES GREATER THAN 43.2 AND 46.35.	APPROVED
W171 PROCEDURE	CHANGED FLIGHT ACCEPTANCE SINE VIBRATION LEVELS IN THRUST AXIS.	APPROVED
W172 HARDWARE	PERMISSION TO USE SPARE MULTIPLEXER HYBRID MICRO-CIRCUIT WITH SETTLING TIME OF 26 NANOSECONDS INSTEAD OF 20 NANOSECONDS MAX.	APPROVED
W173 PROCEDURE	PERMISSION TO DELETE REQUIREMENT TO PROVIDE A TELESCOPE BASEPLATE TEMPERATURE TELEMETRY CHANNEL.	APPROVED
W174 HARDWARE	PERMISSION TO USE WITH OUT-OF-FIELD RESPONSE. SHOULD BE LESS THAN 1%, IS 3.4%.	APPROVED.

ADDENDUM FOR PRE-SHIPMENT REVIEW

WAIVER NUMBER	DESCRIPTION	STATUS
W175 PROCEDURE	PERMISSION TO ACCEPT TEST SEGMENT 2 OF TP 32015-625 THAT WAS CONDUCTED AT A BUS VOLTAGE OF 28V INSTEAD OF 23V.	APPROVED
W176 PROCEDURE	PERMISSION TO RUN STR F-1 029 AND F-1 033 IN LIEU OF BL 19/20 MINI 3B AND BL 19/20 MINI 4B.	APPROVED
W177 PROCEDURE	PERMISSION TO DELETE TVS 6 ORBIT 8 AND RESEQUENCE TV TS 6 ORBIT 12, ORBIT 13 AND 14 TO FOLLOW TVTS 6 ORBIT 7.	APPROVED

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED 3-29-82

PROCURING ACTIVITY NO. 9

1 ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Dr., Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4 DESIGNATION FOR DEVIATION/WAIVER				5 BASE LINE AFFECTED	6 OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED
a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO	[ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT	[ ] YES [X] NO
FLT 1	11323	TM	D-143		

7 SPECIFICATIONS AFFECTED-TEST PLAN				8. DRAWINGS AFFECTED			
	MFR. CODE	SPEC./DOC. NO.	SCN	MFR. CODE	NUMBER	REV.	MOD. NO.
a. SYSTEM							
b. ITEM	82577	TP32015-531			None		
c. TEST PLAN							

9. TITLE OF DEVIATION/WAIVER
Thematic Mapper Configuration for Starting IA-07 Test

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
TM 51065

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Test Procedure

16. PART NO OR TYPE DESIG.

17. LOT NO.

18. QTY
1

19. REQUIRES DEVIATION/WAIVER [ ] YES [X] NO

20. EFFECT ON COST/PRICE
NONE

21. EFFECT ON DELIVERY SCHEDULE
None, if deviation is approved

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT INTERFACE, ETC.
NONE

23. DESCRIPTION OF DEVIATION/WAIVER Request authorization to start IA-07 531 (Power and Grounding) without the following items assembled on TM (51065):

1. Radiative Cooler 51200
2. Circuit Boards: 50920 Temp.Controller and dc Restore
   50942 Temp.Control
   50912 Band 6 Buffer
   50908-1 Band 5 Buffer
   50908-2 Band 7 Buffer

24. NEED FOR DEVIATION/WAIVER
To proceed with IA-07 testing until the assemblies are available for proper configuration for IA-07 Test. After installation of the Radiative Cooler and the Bands 5, 6, 7 Buffers, Sections 5.3.4 and 5.3.5.23 through 5.3.5.27 of TP 32015-531 will be conducted.

PE [signature] 3/29/82

QA [signature] 3/29/82

REA [signature] 3/29 SYS ENGR [signature] 3-29-82

25 PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26 SUBMITTING ACTIVITY AUTHORIZING SIGNATURE [signature] 3/29/82

TITLE Minor - System Engineering
Major/Critical - Program Manager

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY
NASA

SIGNATURE [signature] DATE 3/29/82

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[signature]

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 4-1-82

PROCURING ACTIVITY NO.: P

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER
3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO
F1	11323	TM	D-144

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM	11323	TP32015-531,2,3	
c. TEST PLAN		-514	

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR NO.

9. TITLE OF DEVIATION/WAIVER
Test with Open 208 kHz Sync Lines

10. CONTRACT NO. & LINE ITEM: NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
F1 Thematic Mapper Assy

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OF LOWEST ASSEMBLY AFFECTED: F1 Thematic Mapper Assy
16. PART NO. OR TYPE DESIG.: 51065-E
17. LOT NO.: N/A
18. QTY: 1
19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.

23. DESCRIPTION OF DEVIATION/WAIVER
1.Perform Electronics-Module Integration Tests (TPs-531,-532, -533)with 208 kHz sync lines to PS1 and PS2 opened up via B.O.B.*(P46:R5;S5:U5;V5;T5; and W5) switches. During IA07 Part III(TP-533), perform video-verification test collects (VIDVER) with B.O.B. switches closed and open to achieve comparison.
2. At conclusion of AC02, the sync-line contacts will be removed from connector A1-P46, insulated and tied back per Class 1 ECP ** to be written at that time.
(Item 23, Statement 1. cont.)
Also, during AC02 test phase, expose the instrument to a low-to-moderate,48°-SIS, radiance and sequentially fill the COMPTAL CRT with video data from one detector in each band and critique each display for periodic artifacts.
* or by extracting, and labelling, the 6 contacts at the P46 Wear Conn.

24. NEED FOR DEVIATION/WAIVER
Spurious power-supply shutdowns occur with the sync lines normally connected. When 208 kHz sync to the power supplies is disabled, the shutdown problems are avoided. No change in System Performance is anticipated, based on previous testing (PF).

** GSFC Spec #400.8-D-210, Rev B, p23, Par 3.3.4.4.3 states: "...dc converters of the power supply shall be synchronized to the multiplexer."

REA [signature] SYS ENGR [signature]
RE [signature] 4/2/82
QA [signature] 4/2/82
PE [signature] 4-2-82
CMO [signature] 4-26-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 Serial No. 3 ONLY

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: [signature] 2 Apr 82
TITLE: Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED | b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC
SIGNATURE: George B Britt
DATE: 4/6/82

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Program Instructio J10

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 4-1-82 5810L

PROCURING ACTIVITY NO.: 0

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4 DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEVIATION NO.
F1	11323	TM	D-144

5 BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6 OTHER SYSTEM/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7 SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM	11323	TP32015-531,2,3	
c. TEST PLAN		-514	

8. DRAWINGS AFFECTED

MFR CODE	HEADER	REV	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
Test with Open 208 kHz Sync Lines

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11 CONFIGURATION ITEM NOMENCLATURE
F1 Thematic Mapper Assy

CLASSIFICATION OF DEFECT

12. CD NO | 13 DEFECT NO | 14 DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15 NAME OF PART OR LOWEST ASSEMBLY AFFECTED: F1 Thematic Mapper Assy
16 PART NO. OR TYPE DESIG.: 51065
17. LOT NO.: N/A
18. QTY: 1
19 RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20 EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE

22 EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACES, ETC.

23 DESCRIPTION OF DEVIATION/WAIVER

1.Perform Electronics-Module Integration Tests (TPs-531,-532, -533)with 208 kHz sync lines to PS1 and PS2 opened up via B.O.B.*(P46:R5;S5:U5;V5;T5; and W5) switches. During IA07 Part III(TP-533), perform video-verification test collects (VIDVER) with B.O.B. switches closed and open to achieve comparison.

2. At conclusion of AC02, the sync-line contacts will be removed from connector A1-P46, insulated and tied back per Class 1 ECP ** to be written at that time. (Item 23, Statement 1. cont.)

Also, during AC02 test phase, expose the instrument to a low-to-moderate,48"-SIS, radiance and sequentially fill the COMPTAL CRT with video data from one detector in each band and critique each display for periodic artifacts.

* or by extracting, and labelling, the 6 contacts at the P46 Rear Conn.

24 NEED FOR DEVIATION/WAIVER

Spurious power-supply shutdowns occur with the sync lines normally connected. When 208 kHz sync to the power supplies is disabled, the shutdown problems are avoided. No change in System Performance is anticipated, based on previous testing (PF).

** GSFC Spec #400.8-D-210, Rev B, p23, Par 3.3.4.4.3 states: "...dc converters of the power supply shall be synchronized to the multiplexer."

RE [signature] 4/2/82
QA [signature] 4/2/82
REA [signature] SYS ENGR [signature] PE [signature] 4-2-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
Serial No. 3

26 SUBMITTED ACTIVITY AUTHORIZING SIGNATURE: [signature] 2 Apr 82
TITLE: Minor - System Engineering
Major/Critical - Program Manager

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC
SIGNATURE: George B Litt DATE: 4/16/82

DD FORM 1694

(SEE MIL-STD-481 FOR INSTRUCTIONS)

6 April 82

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER
3. [ ] MINOR [X] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER				5. BASE LINE AFFECTED	6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED
a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.	[X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT	[ ] YES [X] NO
Flight	11323	TM	D-145		

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN	11323	GSFC 400.8-D-201	

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	MOD. NO.

9. TITLE OF DEVIATION/WAIVER
EMI TEST DELETIONS

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Instrument

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT CD. | 14. DEFECT CLASSIFICATION [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: F-1 Thematic Mapper Instrument
16. PART CD. OR TYPE DESIG.: 51065
17. LOT NO.: S/N003
18. QTY: 1
19. RECURRING DEVIATION/WAIVER [ ] YES [X] NO

20. EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.

23. DESCRIPTION OF DEVIATION/WAIVER
Waive the following test requirements of GSFC 400.8-D-201, GSFC specification - Thematic Mapper Interface Control Document, paragraph 4.2:

a) Radiated Emission RE02 (Electric Field)
b) Radiated Emission RE04 (Magnetic Field)
c) Radiated Susceptibility RS03 (E Field)
d) Conducted Emission CE01 and CE03 (Powerline)

It is requested that the EMC Test Requirements for F-1 are CS01, CS02, and CS06 only.

24. NEED FOR DEVIATION/WAIVER
EMC tests of the Engineering Model and Protoflight Model Thematic Mapper instruments showed no significant susceptibility to radiated fields; this has been confirmed by Landsat-D Spacecraft EMC tests. Landsat-D tests have also demonstrated that the spacecraft is not susceptibile to radiated or conducted emissions from the Protoflight Model Thematic Mapper.

Deletion of the above tests would eliminate the necessity of transporting the Thematic Mapper and test equipment to an EMC test facility.

REA [signature] Sys.Eng. [signature] Rel [signature] QA [signature] PE [signature] 4-7-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: [signature] 4-6-82
TITLE: [illegible] — Program Manager

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED
b. [ ] APPROVED [ ] DISAPPROVED
c. GOVERNMENT ACTIVITY | SIGNATURE | DATE

DD FORM 1694

HUGHES

INTERDEPARTMENTAL CORRESPONDENCE

CIP

TO: J. Engel CC: Distribution DATE: Sept. 14, 1981
ORG: REF. HS256-2257

SUBJECT: EMI/EMC Retest (Engineering Model Mapper) FROM: Y. Ban
ORG.

BLDG. S1 MAIL STA. D339
LOC. SC EXT. 5-8811

INTRODUCTION:

In the initial EMI/EMC test of the Engineering Model Thematic Mapper, it was found that the Mapper was susceptible in specific frequency ranges to conducted interference. In particular, during the conduct of tests CS01 and CS02, the Mapper exhibited general susceptibility throughout the frequency range of 6 Khtz to 80 Khtz. The susceptibility peaks occurred in the frequency range from 20 Khtz to 45 Khtz.

Throughout the remainder of the EMI/EMC test, i.e., radiated susceptibility and tests which examined the Mapper's immunity to spikes on the power line, only two marginal performance inquiries were noted.

1. The Mapper radiated a 10 Mhtz interference in the vacinity of J-18, J-19 and J-24.
2. Inserting a 28 V negative spike in the 28 V return line resulted in the shutter losing "phase lock". Retesting, briefly, with a reduced negative spike of 26 V on the 28 V return line resulted in no anomolous shutter behavior.

SUBJECT:

I. Retests conducted to ascertain the correlation between susceptibility signatures to specific changes in BTCE/Mapper grounding configurations provided little or no conclusive data relevant to "improved" performance. All tests run with the intent of achieving an acceptable mapper susceptibility profile through a variation in the system grounding scheme resulted in susceptibility signatures which similiarly characterized the Mapper during the initial EMI/EMC tests.

Noteworthy, in the analysis of retest results is the fact that although apparent improvements were observed with certain grounding configurations, these improvements were:

1. The result of monitoring channels with lower gain.
2. The result of CS01/CS02 test configurations which also exhibited higher Mapper immunity during the initial test.
3. The result of the "subjective" determination of when a particular recovery threshold occurs.

For the most part if performance improvements could not be categorized in the aforementioned, these improvements were not significant in frequency range or magnitude to be worthy of note.

II. Retests conducted to evaluate the Engineering Model Mapper's susceptibility signatures to conducted interference with 8 Khtz filters inserted between the interference source and the Mapper are depicted in graphs 1 and 2.

The RF source injection method for the frequency range of 20 Htz to 50 Khtz was inductive and for the frequency range 50 Khtz to 150 Khtz was capacitive. The two different injection methods created noise signatures to vary in curve continuity, i.e., for the range from 11 to 50 Khtz, no noise was visible/discernable on the Comptol and the Datum D/A output, whereas noise was definitely visible, although in low counts, at the beginning of CS02 (50 Khtz). (Example graph 1).

The upper trace of the graphs depict the values at which noise recovery was exhibited, labeled threshold voltage P.P. and the lower trace shows recognizable interference as a function of injected RF frequency.

A. Graph 1 depicts the interference signatures with the RF source inserted into the 28 V line. The graph is a composite of a variety of tests run:

   1. With the source swept from 20 Htz to 150 Khtz.
   2. With the Kepco power at 25 V and 28 V.
   3. With the Mapper in "Picture Mode" via Power Supply 1 or 2.
   4. With the source inserted first in J-18 then J-19.
   5. With the count's recorded monitoring Band 1 Detector 1 or 2 (high gain channels).
   6. With a second filter in and out of the return line.

   In the above discussed configurations and variations the interference signatures were essentially identical. Peaks and nodes where recognizable noise patterns were observed were at 11 Khtz and 55 Khtz.

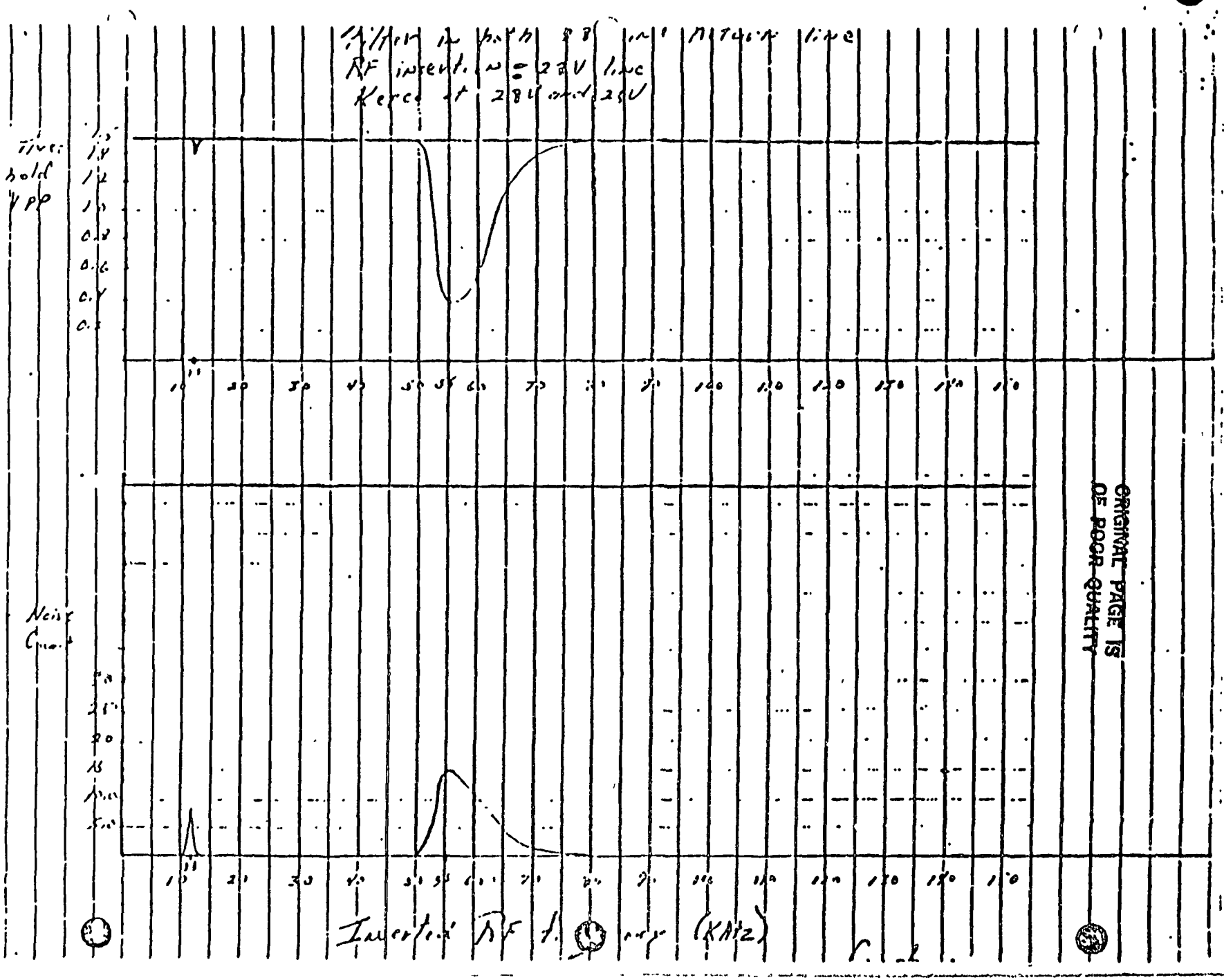
B. Graph 2 shows the noise signatures observed with the RF source inserted into the 28 V return line. Again the graph is a composite of a variety of tests run with the configurations and variations discussed in II-A-(1-6) with the exception of item 6 where the second filter was inserted and removed from the 28 V line. All combinations exhibited similiar if not identical interference signatures.

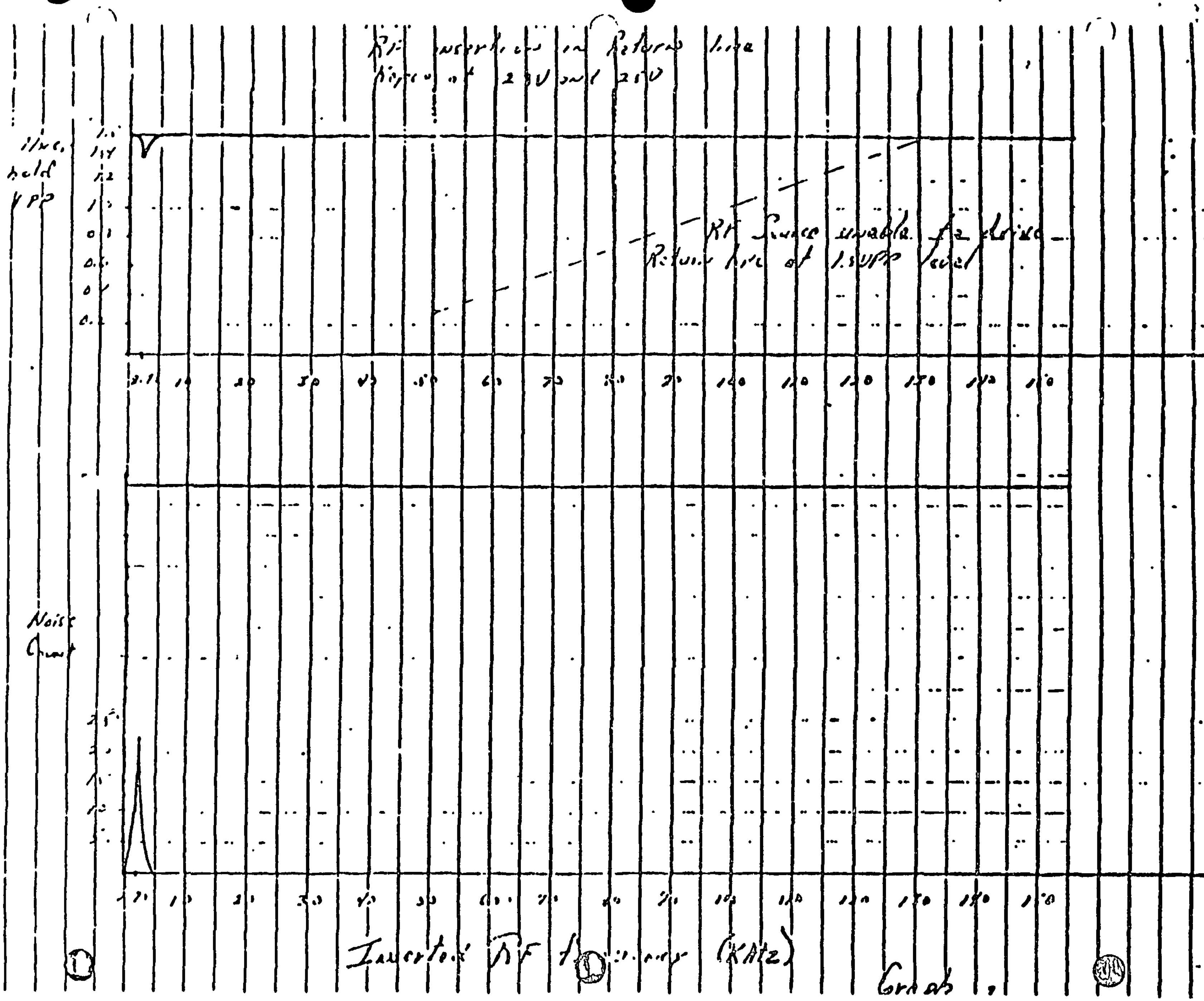
   At 2.75 Khtz a Mapper noise susceptibility pattern occurred with a peak count of approximately 22. No susceptibility was evidenced in the frequency range greater that 50 Khtz. A possible accounting of this disparity, since interference was observed in a test with insertion in the 28 V line at 55 Khtz, could be due to the fact that the EMI instrument could only drive the load with 0.3 VPP at 50 Khtz, as shown on the upper trace of graph 2.

C. Filters were inserted into the 28 V return and 28 V line for J-24. Again the variations of test configurations discussed in II-A-(1-6) were run with RF injected in first the 28 V line then the 28 V return. No discernable noise was detected throughout the range of 20 Htz. to 150 Khtz.

SUMMARY

With filters in all 28 V power (hot and return) to the Mapper, and observing a higher gain channel, noise was observed at 2.75 Khtz (22 counts), 11 Khtz (8 counts), and from 50 Khtz to 75 Khtz (Peak noise count of 15). The signatures depicted on Graphs 1 and 2 show marked improvement in the Mappers conducted susceptibility with the addition of input filters when compared with the "prefilter" graphs 3 and 4. Also graphs 3 and 4 are composites of noise signatures exhibited during the initial tests observing Band 4 Detector 9 (one of the lower gain channels). Also of particular relevance is the lack of susceptibility with filters in the range of 20 Khtz to 30 Khtz, a frequency region the spacecraft is suspected of inserting interference into the 28 V power bus.





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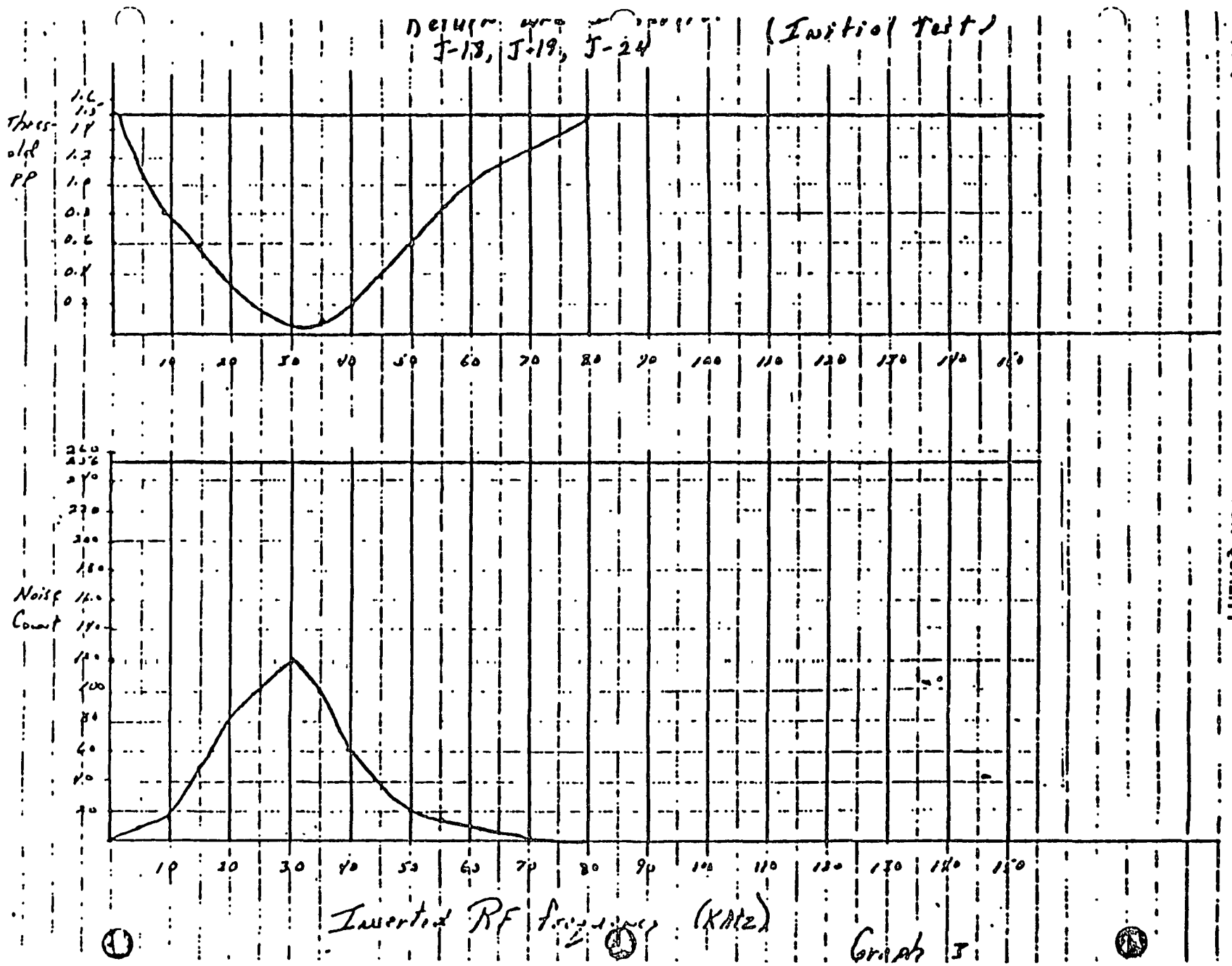

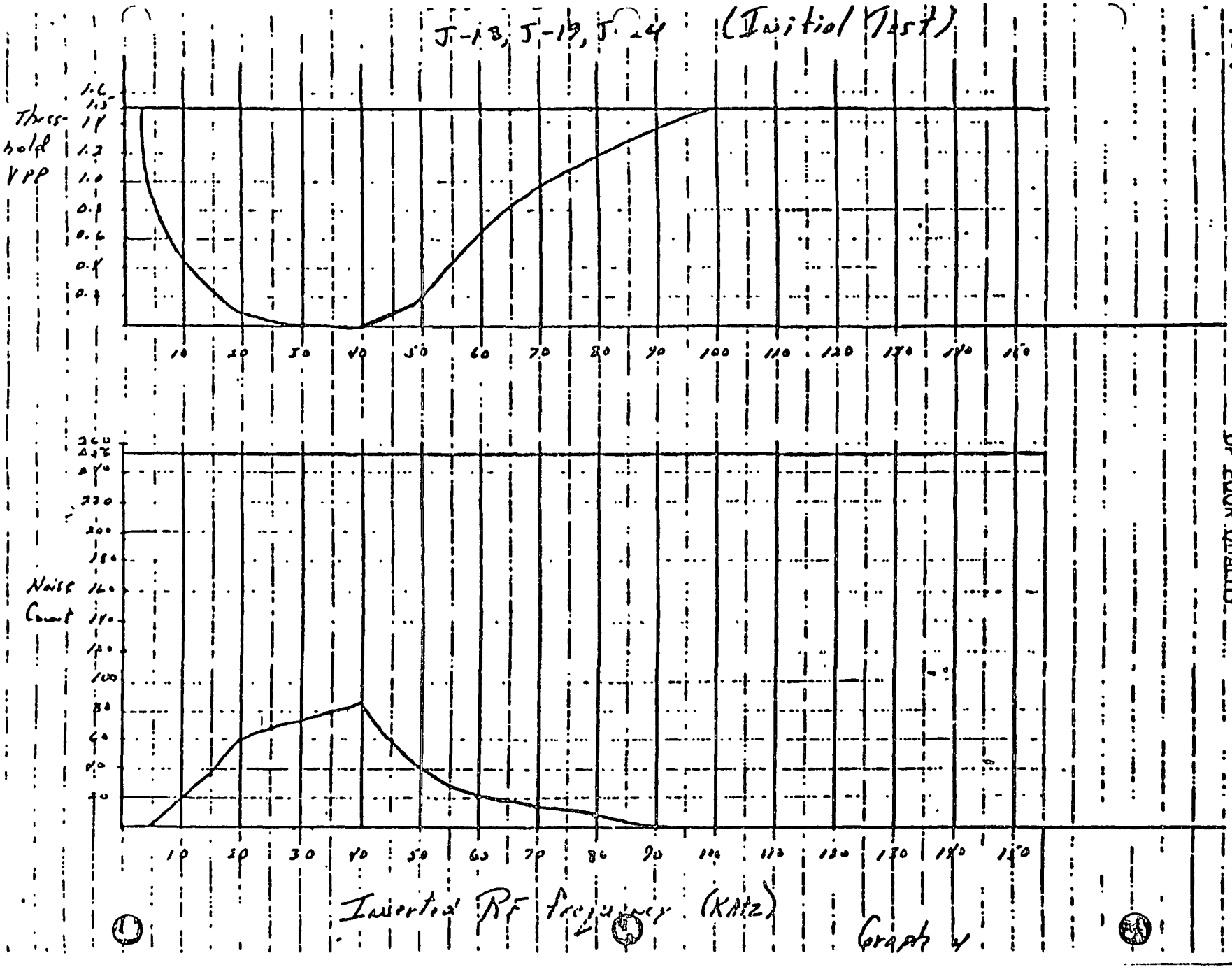

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS) | DATE PREPARED: 08 April 82 | PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS: Santa Barbara Research Center, 75 Coromar Dr., Goleta, CA 93117
2. [X] DEVIATION [ ] WAIVER
3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
FLT 1		TM	D-146

5. BASE LINE AFFECTED: [ ] PLANNED [ ] ALLOCATED [X] PRODUCT
6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	CON
a. SYSTEM			
b. ITEM	11323	TP32015-532,-533	
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV	MOD. NO.
	None		

9. TITLE OF DEVIATION/WAIVER: Thematic Mapper Configuration for Starting IA-07 Test
10. CONTRACT NO. & LINE ITEM: NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE: TM51065
12. CI NO. | 13. SUPPLY NO. | 14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Test Procedure
16. PART NO. OR TYPE DESIG.: 51065-E
17. LOT NO.
18. QTY: 1
19. REQUIRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE: None
21. EFFECT ON DELIVERY SCHEDULE: None, if deviation is approved

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.: None

23. DESCRIPTION OF DEVIATION/WAIVER: Request authorization to start IA-07 -532 (Commands and Telemetry) and -533 (Video/Syst.Timing)without the following items assembled on TM(51065):

1. Radiative Cooler 51200
2. Circuit Boards: 50920 Temp.Controller and dc Restore
   50942 Temp.Control
   50912 Band 6 Buffer
   50908-1 Band 5 Buffer
   50908-2 Band 7 Buffer
3. R/C Door Assembly 51740
4. Relay Optics Assy 52534
5. One of the two SMA Heater Assys (52566-2,-3) will be simulated by similar value fixed resistors until replacement heaters are mounted.

24. NEED FOR DEVIATION/WAIVER: To proceed with IA-07 testing until the assemblies are available for proper configuration for IA-07 test. After installation of the Radiative Cooler and the Bands 5, 6, 7 Buffers, appropriate sections, list attached, will be conducted to completed the IA-07 test sequence. The Relay Optics Assy will be mounted as soon as it is available (expect this to occur during -532), allowing IW & LVDT interfacing to be checked. The R/C Door Assembly electricals will be checked with the assembly connected alongside, not integrated to, the 51065 TM assy.

RE [signature] 4/12/82
QA [signature] 4-12-82
REA [signature] 4/9/82 SYS ENGR [signature] 4/12/82 PE [signature] 4-12-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 S/N 003 Flight Model ONLY
CMO [signature]

26. CONTRACTING ACTIVITY AUTHORIZING SIGNATURE: [signature] 4/12/82
TITLE: Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL
a. [ ] APPROVAL RECOMMENDED
b. [✓] APPROVED [ ] DISAPPROVED
c. GOVERNMENT ACTIVITY: NASA
SIGNATURE [signature] DATE 4/12/82

DD FORM 1694

ATTACHMENT TO DEVIATION D-146

TP 32015-532

5.1.2.16-26	CFPA Heater, BB Heater, SMA Heater command
5.1.2.52-54	Cooler Door Commands
5.1.2.73-79	Fusible Link Commands
5.1.2.84-89	Intem. Stage Heater Commands
5.1.2.100-111	Cooler Door Commands
5.2.4	Frame DC Restore
5.2-6	Thermal Tests
5.2.7	Cooler Door Test
5.2.8	Fusible Link Test
5.2.11	Power Profile
5.2.12.5	Bank 5 and 7 Video only

ORIGINAL PAGE IS
OF POOR QUALITY

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 19 April 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
SANTA BARBARA RESEARCH CENTER
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFG. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
T.M. S/N 003	11323		D-148

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	CSN
a. SYSTEM			
b. ITEM			
c. TEST PLAN	11323	TP32015-626	

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	SER. NO.

9. TITLE OF DEVIATION/WAIVER

Permission to use Engineering Model TP 32015-618 instead of TP 32015-626 for Mass Properties Determination.

10. CONTRACT NO. & LINE ITEM

11. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	16. PART NO. OR TYPE DESIG.	17. LOT NO.	18. QTY	19. REQUIRES DEVIATION/WAIVER
T.M. TOP ASSEMBLY	51065, E	003	1	[X] YES [ ] NO

20. EFFECT ON COST/PRICE
May save cost up to 15K.

21. EFFECT ON DELIVERY SCHEDULE
May save up to 6 days of schedule.

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.

23. DESCRIPTION OF DEVIATION/WAIVER

For T.M. Mass Properties determination, instead of performing TP32015-626 Mass Properties determination, TP32015-618 Mass Properties Test Procedure--Engineering Model will be performed.

It is anticipated that Mass Properties determination as specified on TP32015-618, will be conducted at SBRC.

24. NEED FOR DEVIATION/WAIVER

T.M. Mass Properties determination for P/F SN002 was performed per TP32015-626. This procedure yielded the following data: Weight, CG-X,Y,Z, MOI-Ixx, Iyy, Izz, POI-Ixz, Iyz, Ixy.

This deviation to perform TP32015-618 for F1 SN003 is necessary to determine only the weight and two point CG-Y,Z.

Proto flight SN002 MOI, POI and CGX data will be used as reference. Per attached data, worst case between CG of P/F SN002 and E/M SN001 was 2% difference. Weight difference is less than .1%.

RPE [signature] 4/20/82

QA [signature] 4-20-82

RPA [signature] 042082 SYS ENGR Ralph Wenger PE [signature] 4/20/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
003

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE [signature] TITLE Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [ ] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY | SIGNATURE | DATE

DD FORM 1694

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: Distribution CC: Data Bank (8) DATE: 11 June 1981

REP: HS236-7492

FROM: F. D. McLaughlin

SUBJECT: Thematic Mapper Engineering Model
Weight and Center-of-Gravity

BLDG. 774 MAIL STA. 79
EXT. 4351

The Thematic Mapper Engineering Model (EM) weight and center-of-gravity were measured at SBRC on 1 June 1981 per test procedure TP32015-618, Rev. A. The results of this test are as follows:

A.	EM Uncorrected Gross Weight (pounds/Kg)		528.51/239.73
B.	Instrument Configuration Items Missing		15.06/6.83
	1. Thermal Louvers	2.09 pounds	
	2. Thermal Blankets and Supports	11.37 pounds	
	3. Side Panel	1.60 pounds	
C.	Excess Configuration Items		4.95/2.25
	1. Miscellaneous Instrumentation	4.75 pounds	
	2. Miscellaneous connector protectors	0.1 pounds	
	3. Ground wires	0.1 pounds	
D.	EM Corrected Gross Weight (pounds/Kg) (A + B - C = D)		538.62/244.32
E.	Corrections Required to Project Protoflight Weight		-1.15/-0.52
	1. Conformal Coating of PWB's	+3.08 pounds	
	2. Radiation Plate Material	-6.02 pounds	
	(EM weight, 17.70 pounds, Aluminum)		
	(PF weight, 11.68 pounds, Beryllium)		
	3. SMA - EM vs. PF (24.49 vs. 24.89)	+0.40 pounds	
	4. MUX - EM vs. PF (26.45 vs. 27.44)	+0.99 pounds	
	5. PS - EM vs. PF (22.99 vs. 23.39)	+0.40 pounds	

F. Projected Weight of Protoflight Model 537.47/243.79

G. Center-of-Gravity

$\bar{Y}$ = 11.64 inches

$\bar{Z}$ = 11.51 inches

$\bar{X}$ = -13.5 inches*

*$\bar{X}$ not measured in this test

H. Comparison to Predicted Values

	Measured Value	Predicted Value	Difference
Engineering Model Weight (pounds)	538.62	None	—
PF Model Projected Weight (pounds)	537.47	542.16	-4.69 (0.87%)
$\bar{Y}$	11.64	10.72*	0.92 inches toward Radiative Cooler
$\bar{Z}$	11.91	11.24*	0.67 inches toward nadir

*Values obtained in November 1979 from computer run.

F. D. McLaughlin,
Systems Engineering

/lbg

HUGHES

INTERDEPARTMENTAL CORRESPONDENCE

CIP

TO: A.H. Connor
ORG: 44-29

CC: Distribution

DATE: 4 November 1981
REF. 4131.12/1/146

SUBJECT: Measured Mass Properties
Thematic Mapper Proto-
flight Model

FROM: D.C. Leamon
ORG. 41-31-10

BLDG. S12 MAIL STA. W303
LOC. SC EXT. 88608

REF. 1: Thematic Mapper Interface Control Drawing 3533000-400 Rev C
REF. 2: Internal Memo HS236-1202-8, "Thematic Mapper Mass Properties Summary", F.D. McLaughlin to Distribution, Dtd. 19 Feb 1981.
REF. 3: Internal Memo HS236-7492, "Thematic Mapper Engineering Model Weight and Center-of-Gravity", F.D. McLaughlin to Distribution, Dtd. 11 Jun 1981.
Ref. 4: IDC HS236-2249, "Mass Properties Tare Items for Thematic Mapper Protoflight Model", F.D. McLaughlin to A.M. Carter, Dtd. 1 Oct 1981.

The attached tables present the mass properties of the thematic mapper (Protoflight Model) derived from mass properties testing.

Table I contains the predicted flight properties. The test data has been corrected for non-flight items included in the test configuration and flight items that were not included in the test configuration as listed in Ref. 4.

Table 2 depicts the reference coordinate system for center-of-gravity and moment of inertia data.

Table 3 compares measured mass properties data with drawing requirements and previous predictions. The "Y" and "Z" C.G. data compares favorably to data measured on the engineering model at SBRC (Ref. 3).

The predicted weight is 29.92 pounds less than the maximum allowable weight.

D.C. Leamon

W.T. Griffiths
Mass Properties Engineering

THEMATIC MAPPER

MEASURED MASS PROPERTY DATA

PFH

	U.S. Customary Units		SI (Metric Units)	
Weight:				
	538.87	Pounds	244.43	Kilograms
Centers of Gravity:				
X:	12.935	Inches	32.85	Centimeters
Y:	11.405	Inches	28.97	Centimeters
Z:	11.957	Inches	30.37	Centimeters
Moments of Inertia:				
Ixx:	274239	$lb\text{-}in^2$		
	59.19	$sl\text{-}ft^2$	80.25	$Kilogram\text{-}meter^2$
Iyy:	94195	$lb\text{-}in^2$		
	20.33	$sl\text{-}ft^2$	27.57	$Kilogram\text{-}meter^2$
Izz:	237492	$lb\text{-}in^2$		
	51.26	$sl\text{-}ft^2$	69.50	$Kilogram\text{-}meter^2$
Products of Inertia:				
Ixy:	2715	$lb\text{-}in^2$		
	0.59	$sl\text{-}ft^2$	0.79	$Kilogram\text{-}meter^2$
Ixz:	-518	$lb\text{-}in^2$		
	-0.11	$sl\text{-}ft^2$	-0.15	$Kilogram\text{-}meter^2$
Iyz:	20218	$lb\text{-}in^2$		
	4.36	$sl\text{-}ft^2$	5.92	$Kilogram\text{-}meter^2$

C-2

TABLE 1

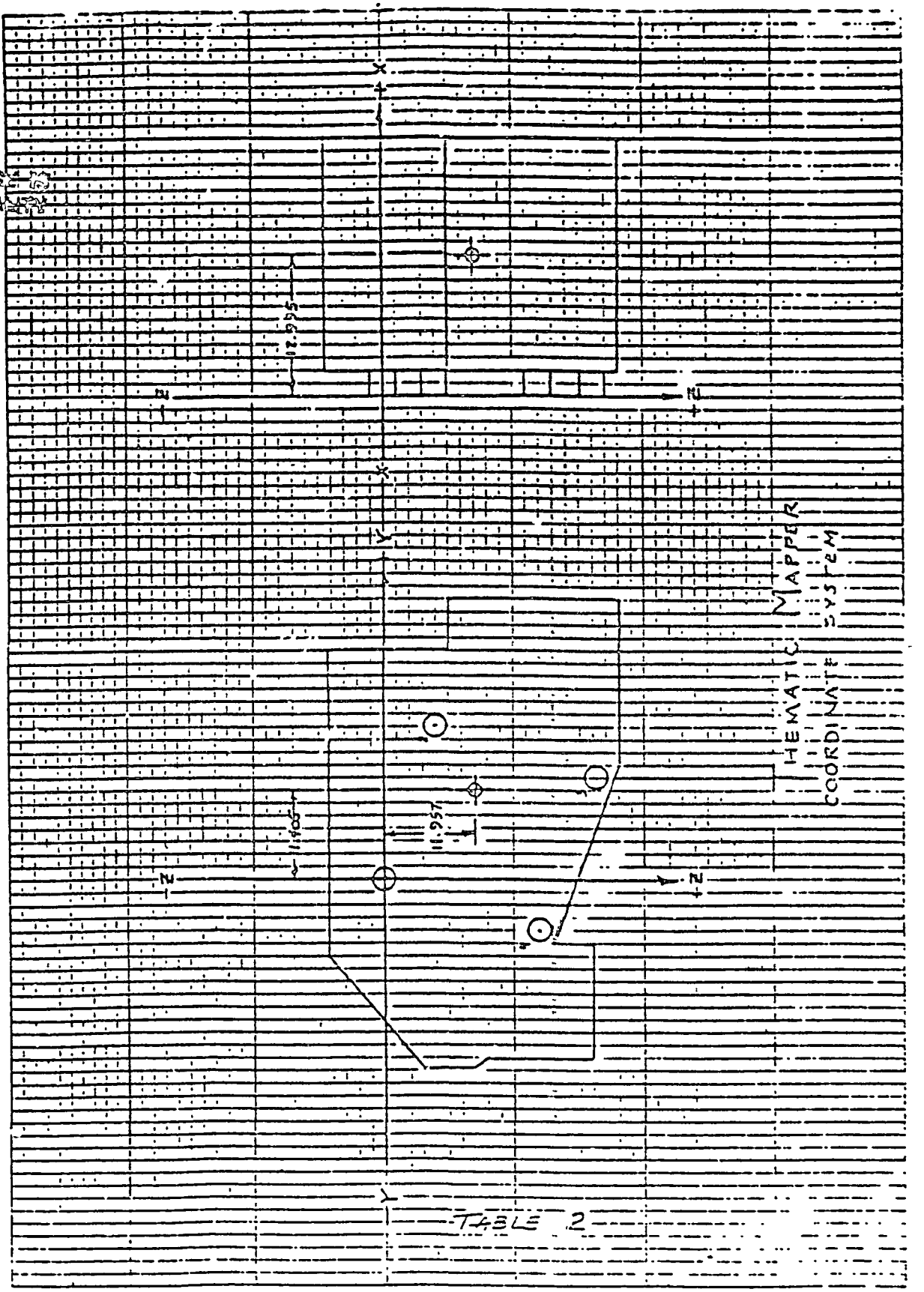

TABLE 2

THEMATIC MAPPER

MASS PROPERTIES STATUS

REFERENCE PARAMETER	AS TESTED	REF 1 ICD 353300-400	REF 2 HS 236-1202-8	REF 3 HS 236-7492
WEIGHT	538.87	568.79*	534.10	537.47
X	12.935	13.0	13.12	-
Y	11.405	11.2	10.72	11.64
Z	11.957	12.4	11.16	11.91
Ix	59.19	-	57.4	-
Iy	20.33	-	20.2	-
Iz	51.26	-	47.1	-
Ixy	0.59	-	-0.51	-
Ixz	-0.11	-	0.41	-
Iyz	4.36	-	3.48	-

*Maximum allowable weight per A Connor

TABLE 3

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

ORIGINAL PAGE IS
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28 May 1982

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER
3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
Flight 1	11323	TM	D-155

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT
6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM	11323	TP32015-504*	
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER: Permission to Substitute Data Bases and Use Band 4 Detector 7 to Conduct IA04 Test

10. CONTRACT NO. & LINE ITEM: NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE: Thematic Mapper

CLASSIFICATION OF DEFECT
12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Test Procedure
16. PART NO. OR TYPE DESIG.: 51065 - G
17. LOT NO.
18. QTY: 1
19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE: NONE
21. EFFECT ON DELIVERY SCHEDULE: None, If Deviation Is Approved

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
NONE

23. DESCRIPTION OF DEVIATION/WAIVER
Permission to change Data-Bases and use Band 4 Detector 7. This will have the impact of creating a bad version of CHNCTR.IVF (For Detector 9 data since there is no signal) when it is called by CMD File.

* {TMIIA6IA4.DAB;5
IA04BSL.DAB;2

NOTE(added on 820604): Band 4 Det 9 is the usual x=0, y=0 reference center for all detector center calculations. The BSD9 signal was not usable due to a SIU-cable problem. The set of det.9s were replaced by det.7s (Bl.4,5,7). The loss of file CHNCTR.IVF is of no concern because the file is not used to do BBR.

24. NEED FOR DEVIATION/WAIVER
Detector 9, in Band 5, signal is not getting through SIU cable. Present Data Bases are set up to Ref. Band 4 Detector 9 signal as ORIGNXON IA04BBR. A fix may require a substantial amount of time and will necessitate demating most of the connectors.

REA [signature] SYS ENGR [signature] for J Engel PE [signature] 6/1/82
QA [signature] 6/1/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 S/N 003 ONLY

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: [signature] for J Engel
TITLE: Systems Engineering

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED
b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC
SIGNATURE: George B. Britt
DATE: 6/4/82

DD FORM 1694

REL...
(SEE MIL-STD-480 OR -481 FOR INSTRUCTIONS)

28 MAY 82

ORIGINAL PAGE IS OF POOR QUALITY

1. ORIGINATOR NAME AND ADDRESS
SANTA BARBARA RESEARCH CENTER
75 COROMAR DR., GOLETA CA 93117

2. [X] DEVIATION [ ] WAIVER
3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER				5. BASE LINE AFFECTED	6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED
a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.	[ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT	[ ] YES [X] NO
FLT 1		TM	D155		

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM	11323	TP32015-504	
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
PERMISSION TO SUBSTITUTE DATA BASES AND USE BAND 4 DETECTOR 7 TO CONDUCT IA04 TEST.

10. CONTRACT NO. & LINE ITEM
NAS 5-24200

11. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER

CLASSIFICATION OF DEFECT

12. CD NO.	13. DEFECT NO.	14. DEFECT CLASSIFICATION
		[ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	16. PART NO. OR TYPE DESIG.	17. LOT NO.	18. QTY	19. RECURRING DEVIATION/WAIVER
TEST PROCEDURE	51065-G		1	[ ] YES [X] NO

20. EFFECT ON COST/PRICE
NONE

21. EFFECT ON DELIVERY SCHEDULE
NONE, IF DEVIATION IS APPROVED

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
NONE

23. DESCRIPTION OF DEVIATION/WAIVER

PERMISSION TO CHANGE DATA BASES AND USE BAND 4 DETECTOR 7. THIS WILL HAVE THE IMPACT OF CREATING A BAD VERSION OF CHNCTR.IVF (FOR DETECTOR 9 DATA SINCE THERE IS NO SIGNAL) WHEN IT IS CALLED BY CMD FILE.

* { TMIIA6IA4.DAB;5
  { IA04BSL.DAB;2

24. NEED FOR DEVIATION/WAIVER

DETECTOR 9, IN BAND 4, SIGNAL IS NOT GETTING THROUGH SIU. PRESENT DATA BASES ARE SET UP TO REF. BAND 4 DETECTOR 9 SIGNAL AS ORIGINKON IA04 BBR. A FIX MAY REQUIRE A SUBSTANTIAL AMOUNT OF TIME AND WILL NECESSITATE DEMATING MOST OF THE CONNECTORS.

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 S/N 003 ONLY

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE | TITLE

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED
b. [ ] APPROVED [ ] DISAPPROVED
c. GOVERNMENT ACTIVITY | SIGNATURE | DATE

DD FORM 1694

SOFTWARE ~~ENGINEERING~~ CHANGE REQUEST

HUGHES
CODE IDENT 81877

ECR NO. — 97273(

SHEET 1 OF 1 SHEETS

REQUEST

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(S)
THEMATIC MAPPER 1162	IAØ4 BAND TO BAND REGISTRATION	TP 32015-504 -C	TMIIA6IA4.DAB IAØ4 BSL.DAB;

DESCRIPTION OF PROBLEM

DETECTOR 9, IN BAND 4, SIGNAL IS NOT GETTING THROUGH S.I.U. A FIX MAY REQUIRE A SUBSTATIAL AMOUNT of TIME AND WILL NECESSITATE DEMATING MOST OF THE CONNECTORS. DATA BASES ARE SET UP TO REF. BAND 4 DETECTOR 9 SIGNAL AS ORIGINATION IAØ4 BBR.

PROPOSED SOLUTION

CHANGE DATA BASES AND USE BAND 4 DET. 7 THIS WILL HAVE ~~THE~~ THE IMPACT of CREATING A BAD VERSION of CHANCTR.IVF (for DETECTOR 9 DATA SINCE THERE IS NO SIGNAL) WHEN IT IS CALLED BY CMD FILE.

WHEN IAØ4 TEST IS COMPLETE, RESTORE OLD FILES TO BE CURRENT VERSIONS. THE CHNCTR.IVF FILE CREATED DURING TEST SHOULD BE DELETED

REQUESTED BY	EXT	BLDG./M/S	ORG CODE	DATE	URGENCY
C.J. KENT	6268	B-11/78	22-21	5/17/82	URGENT
APPROVED	6195	B11/101	2242	820517	RECM EFF: S/N 003 ONLY
APPROVED	6324	B11/29	2203	5/26/82	RECM DISP OF ITEMS: RETAIN OLD VERS of FILES. REST AFTER IAØ4

DISPOSITION

☒ ACCEPTED
☐ REJECTED

REASON FOR REJECTION: Tom: Deviation form should be used since this a temporary condition.

DATE RECD IN ECC | SCH REPLY DATE | ADVA ☐

CHANGE CLASS ☐ I ☐ IIA ☐ IIB | SPECIFICATION OR CONTROL ITEM | RESP SPEC ACT. OR RESP ENGRG ACT. | ECA NUMBER

DOCUMENT NO.(S) FOR IIB CHANGE

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	DA
			RESP SPEC ACT.			PROGRAM MGMT		22-4/5/

CLASS IIB RELEASE AUTHORIZATION

CHANGE EFFECTIVITY	CONTRACT NO	MANUFACTURING	DA
DISPOSITION OF ITEMS	CUSTOMER DATE	ENGRG CHANGE CTR	DA

5252 CS OCT 72

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (USE MIL-STD-480 OR MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED: 7 June 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA. 93117

2. [X] DEVIATION [ ] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. ENG. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
Flight (Fl)	11323	TM	D-158

5. BASE LINE AFFECTED: [X] FUNC. TIONAL [ ] ALLO. CATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	ENG. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN	11323	GSFFC 400.8-D-201	

8. DRAWINGS AFFECTED

ENG. CODE	NUMBER	REV.	MOD. NO.

9. TITLE OF DEVIATION/WAIVER
EMI/EMC Tests Deletion

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: F-1 Thematic Mapper Instru.

16. PART NO. OR TYPE DESIG.: 51065-83

17. LOT NO.:

18. QTY: 1

19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE: May save cost associated with schedule.

21. EFFECT ON DELIVERY SCHEDULE: May save up to 1 week of schedule

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
This deviation is requested to supersede D145 as originally submitted. Deviation is requested to waive the following test requirements of GSFC 400.8-D-201, GSFC specification - Thematic Mapper Interface Control Document

a) Radiated Emission RE02 (Electric Field)
b) Radiated Emission RE04 (Magnetic Field)
c) Radiated Susceptibility RS03 (E Field)

It is requested that the EMC test requirements for F-1 are CS01, CS02, CS06, CE01, and CR03.

24. NEED FOR DEVIATION/WAIVER
EMC tests of the Engineering Model and Protoflight Model Thematic Mapper instruments showed no significant susceptibility to radiated fields: this has been confirmed by Landsat-D Spacecraft EMC tests.

Deletion of the above tests would eliminate the necessity of transporting the Thematic Mapper and test equipment to an EMC test facility; allowing for testing to be conducted at SBRC.

RE 6/7/82
QA 1st 7/82
RPA SYS ENGR PE 7-2-82
CMO 7-15-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 SN 003 ONLY

26. SIGNATURE: FRC Pfeffers — TITLE: Minor - System Engineering; Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED — b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY — SIGNATURE: Elizabeth Chat... — DATE: 4/20/82

DD FORM 1694 O.C to proceed... pending board approval at S.R.

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 13 JUL 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 92117

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	1M	D- 161

5. CASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM		TP32015-512, -529	
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	ADD. NO.
	---		

9. TITLE OF DEVIATION/WAIVER: Allow deviation from Flight configuration for AC02, AC22, and S-T: F1-015

10. CONTRACT NO. & LINE ITEM:

11. CONFIGURATION ITEM NOMENCLATURE: Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO.:

13. DEFECT NO.:

14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED:

16. PART NO. OR TYPE DESIG.: 51065-5

17. LOT NO.:

18. QTY: 1

19. REQUIRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE:

21. EFFECT ON DELIVERY SCHEDULE: 1 day delay

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.:

23. DESCRIPTION OF DEVIATION/WAIVER

1. Request acceptance of spec-test F1-015 data taken under conditions (1), (2), and (3) described in memo HS236-8072.
2. Request approval to continue thru AC02 Radiometric Calibration data collects under conditions (1), (2), and (3) described in memo HS236-8072.
3. Request approval to perform AC22 under conditions (1), (2), and (3) described in memo HS236-8072.

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24. NEED FOR DEVIATION/WAIVER

(See memo HS236-8072)

RE [signature] 7/13/82
QA [signature] 7/13/82
REA [signature] SYS ENGR [signature] PE [signature] 7/13/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 SN 003 ONLY
C.M.O. [signature] 7/15/82

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: [signature] 7/13/82
TITLE: Minor - System Engineering
Major - Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA
SIGNATURE: [signature] DATE: 7/15/82

DD FORM 1694 [signature] 7/15/82

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OF POOR QUALITY

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 16 July 1982

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
G.S. Plews
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRIT

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEVIATION NO.
P-1 TM	11323	TM	D-162

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECT: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	REV.
a. SYSTEM	11323	TP32015-529	
b. ITEM		-517	
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	MOD. NO.

9. TITLE OF DEVIATION/WAIVER
Continue AC tests and do BL tests with partial TM configuration

10. CONTRACT NO. & LINE
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION [ ] MINOR [ ] MAJOR [ ] CRIT

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	16. PART NO. OR TYPE DESIG.	17. LOT NO.	18. QTY	19. REQUIRING DEVIATION/WAIVER
Thematic Mapper Assembly	51065	003	1	[ ] YES [X] NO

20. EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE
3 day delay if not approved

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.

23. DESCRIPTION OF DEVIATION/WAIVER
Allow AC and BL tests to proceed without full TM electronic configuration. Permit system engineering to determine permissible testing relative to what TM functions are disabled.

24. NEED FOR DEVIATION/WAIVER
1. Band 6 gains must be re-scaled. Therefore the A1 A16 PWB must be removed for rework.
2. The 50942 Temp.Control PWB must be removed to complete prior rework.

REA [signature] SYS ENGR [signature]

RE [signature] 7/17
QA W.J. Williams 7/17
PD [signature] 7/17
CMO B. Jackson 7/19

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE [signature] 7/16/82 TITLE

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC

SIGNATURE [signature] DATE

DD FORM 1694

☆ GPO 1969 — 343

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 22 July 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117
J. A. Walker

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F1 TM	11323	TM	D163

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	11323	TP32015-518	Rev. A
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	MOD. NO.

9. TITLE OF DEVIATION/WAIVER
Manual operation of Calibrator Control Console (CCC)

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper Assembly

16. PART NO. OR TYPE DESIG.
51065

17. LOT NO.
003

18. QTY
1

19. REQUIRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE
--

21. EFFECT ON DELIVERY SCHEDULE
2-day delay

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
--

23. DESCRIPTION OF DEVIATION/WAIVER

Perform BL10 tests with manual operation of the CCC. (Manual positioning of six-position mirrors.) The following paragraphs of TP32015-518 will be affected: 4.1, 4.4.1.6, 5.4 and 5.5.2.

24. NEED FOR DEVIATION/WAIVER
Rotary stages of TM calibrator inoperative.

REA [signature] SYS ENGR [signature] 7/22/82 PE [signature] 7/2
QA [signature] 7/2
CMO [signature]

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
003

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE

TITLE: Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA/GSFC

SIGNATURE: George B. Britt DATE: 7/22/82

DD FORM 1694

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 23 July 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS: J. A. Walker
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [X] DEVIATION [ ] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO
F1 TM	11323	TM	D-164

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	11323	TP 32015-520	Rev. -
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER: Manual operation of Calibrator Control Console (CCC)

10. CONTRACT NO. & LINE ITEM: NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE: Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO.:

13. DEFECT NO:

14. DEFECT CLASSIFICATION: [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper Assembly

16. PART NO. OR TYPE DESIG.: 51065

17. LOT NO.: 003

18. QTY: 1

19. REQUIRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE: --

21. EFFECT ON DELIVERY SCHEDULE: 2-day delay

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.: --

23. DESCRIPTION OF DEVIATION/WAIVER

Perform BL12 test with manual operation of the CCC. (Manual positioning of rotary stages.) The following paragraphs of TP 32015-520 will be affected: 4.1, 4.4.6, 4.4.8.1, 4.4.8.2, 5.2, 5.4.1.1, 5.4.1.2, and 5.4.2.

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24. NEED FOR DEVIATION/WAIVER

Rotary stages of TM calibrator inoperative.

REA 8/20/23 SYS ENGR 7/23/82 RE 7/21/82

25. PRODUCTION/EFFECTIVITY BY SERIAL NUMBER: 003

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: TITLE: Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA/GSFC

SIGNATURE: George B. Scott DATE: 7/23/82

DD FORM SEC 1694

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta CA 93117

2. [XX] DEVIATION [ ] WAIVER

3. [XX] MINOR [ ] MAJOR [ ] CRITICAL

4 DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO
FL TM	11323	TM	D165

5. BASE LINE AFFECTED: [XX] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [XX] NO

7 SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	11323	TP32015-525	REV B
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
Permission to perform BL07, BL12, BL16 & BL19/20 tests with partial TM Configuration

10. CONTRACT NO. & LINE ITEM
NAS 5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO. | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION [ ] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper Assembly
16. PART NO. OR TYPE DESIG.: 51065
17. LOT NO.: 003
18. QTY: 1
19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE
None

21. EFFECT ON DELIVERY SCHEDULE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
Perform BL07, ~~BL12~~, BL16 & BL19/20 tests with TM Band 6 postamp board removed. No part of the test or the TP is affected by the lack of Band 6 board, since no Band 6 measurements are involved in the BL19/20 tests.

24 NEED FOR DEVIATION/WAIVER

REA _____ SYS ENGR _____ PE _____ QA _____ RE _____

25 PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26 SUBMITTING ACTIVITY AUTHORIZING SIGNATURE

TITLE: Minor - System Engineering
Major/Critical - Program Manager

27 APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC

SIGNATURE: George B. Britt

DATE: 7/24/80

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 8-6-82

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Dr., Goleta, CA 93117

2. ☐ DEVIATION [✓ WAIVER]

3. ☐ MINOR [✓ MAJOR] ☐ CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F1	11323	TM	W-167

5. BASE LINE AFFECTED: [✓ FUNCTIONAL] ☐ ALLOCATED ☐ PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: ☐ YES [✓ NO]

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV	NOR. NO.
11323	50904	G	4072A

9. TITLE OF DEVIATION/WAIVER
Resistor Incorporation

10. CONTRACT NO. & LINE ITEM
NAS 5-24200 Item 3

11. CONFIGURATION ITEM NOMENCLATURE
Electronics Module Assembly

CLASSIFICATION OF DEFECT
12. CD NO.
13. DEFECT NO.
14. DEFECT CLASSIFICATION: ☐ MINOR [✓ MAJOR] ☐ CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
PWB Assy Postamp Band 1

16. PART NO. OR TYPE DESIG.
50904-1/G

17. LOT NO.

18. QTY
1

19. RECURRING DEVIATION/WAIVER: ☐ YES [✓ NO]

20. EFFECT ON COST/PRICE
None

21. EFFECT ON DELIVERY SCHEDULE
8 mos. schedule impact if disapproved

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER

This waiver cancels and supersedes D-159

This waiver authorizes the cancellation of EO 4515A against affected drawing number and the retraction of changes already incorporated into the "E" revision of schematic 50905. In addition, allow the cutting of traces of 16 resistors per sheets 2 thru 6 of this waiver and allow alternate wiring process per SP80165 to install 16 resistors on Band 1 PWB Assy to eliminate coherent noise per FR5779.

24. NEED FOR DEVIATION/WAIVER
Redesign and reprocurement of electronic circuit boards would be required in order to eliminate alternate wiring. Minimum 8 mouths schedule slip and considerable cost would be involved. Redesign is not considered cost effective at this time.

REA [illegible] 8/9/82 SYS ENGR [illegible] 8/10/82

RE [illegible]
QA [illegible] 8-10-82
PE [illegible] 8-10-82
CMO [illegible] 9/9/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 SN 003 only

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE
[illegible]

Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. ☐ APPROVAL RECOMMENDED

b. [✓ APPROVED] ☐ DISAPPROVED

c. GOVERNMENT ACTIVITY
NASA/GSFC

SIGNATURE [illegible]

DATE 8/31/82

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 9 August 1982

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [ ] DEVIATION [X] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	TM	W168

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	11323	SS32015-001	
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
Coherent Noise Band 5 Channel 7

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

12. CD NO.

13. DEFECT NO.

14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED

16. PART NO. OR TYPE DESIG.: 51065

17. LOT NO.

18. QTY

19. RECURRING DEVIATION/WAIVER: [ ] YES [ ] NO

20. EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
Per failure report S8160, Band 5 Channel 7 has approximately 1.7 counts of noise while the rest of the band averages below 1.3 counts. The noise has been determined to have a coherent component at approximately 9.3 kHz. The cause of the coherent component has not been determined but the level has been consistent.

24. NEED FOR DEVIATION/WAIVER
Though the specification SS53015-001 allows for no discernable coherent noise, the amount shown by Band 5 Channel 7 is low enough to allow excellent image quality. Investigations as to cause, beyond those already done, would be a hazard to the hardware.

REA *F.M. Phillips* SYS ENGR *J.L. Engel* / *R. Wengler*

RE *[signature]* 8/9/82
QA *[signature]* 8-9-82
PE *[signature]* 8-9-82
CMO *S.J. Jackson* 8/9/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE
F.M. Phillips

Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY
NASA/GSFC

SIGNATURE *Elizabeth Clinton* DATE 8/31/82

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Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR -81 FOR INSTRUCTIONS)

DATE PREPARED: 9 August 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. ☐ DEVIATION [✓ WAIVER]

3. ☐ MINOR [✓ MAJOR] ☐ CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	TM	W169

5. BASE LINE AFFECTED: [✓ FUNCTIONAL] ☐ ALLOCATED ☐ PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: ☐ YES [✓ NO]

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	11323	SS32015-001	
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
Spectral Matching

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

12. CB NO.:
13. REPORT NO.:
14. DEFECT CLASSIFICATION: [✓ MINOR] ☐ MAJOR ☐ CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper
16. PART NO. OR TYPE DESIG.: 51065
17. LOT NO.: 003
18. QTY: 1
19. RECURRING DEVIATION/WAIVER: ☐ YES [✓ NO]

20. EFFECT ON COST/PRICE
None

21. EFFECT ON DELIVERY SCHEDULE
None

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER The spectral matching test is conducted to determine that there is no greater variation than 0.5% from channel to channel within a band as the spectral content of the scene is changed. HS236-8084-1 shows that the test data for band 1 has a variation of 0.65% and band 4 has a variation of 1.35% as reported on failure report S8162.

24. NEED FOR DEVIATION/WAIVER There have been significant improvements in testing technique and the data is close to being acceptable. However, the data exceeds the specification and a determination has not been made as to the cause of the discrepancy. The detectors and filters were fabricated using the latest technology so it is not knowe that any improvement could be made.

REA [illegible] SYS ENGR [illegible] [illegible]

RE [illegible] 8/9/82
QA [illegible] 8-9-82
PE [illegible] 8-9-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER

CIMO SJ Jackson 9/9/82

26. [illegible] SIGNATURE
[illegible]

Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. ☐ APPROVAL RECOMMENDED

b. [✓ APPROVED] ☐ DISAPPROVED

c. GOVERNMENT ACTIVITY
[illegible] /GSFC

d. SIGNATURE
[illegible]

e. DATE
[illegible]

DD FORM 1694

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR -481 FOR INSTRUCTIONS)

DATE PREPARED: 10 August 1982

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [ ] DEVIATION [X] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	TM	W170

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEM/CONFIGURATION ITEMS AFFECTED: [ ] YES [ ] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM	GSFC	400.8-D210	
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	MOD. NO.

9. TITLE OF DEVIATION/WAIVER
Spatial Coverage

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assembly

CLASSIFICATION OF DEFECT

12. CD NO.

13. DEFECT NO.

14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper

16. PART NO. OR TYPE DESIG.
51065

17. LOT NO.
003

18. QTY
1

19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE

21. EFFECT ON DELIVERY SCHEDULE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
The IFOV sizes of all detectors in bands 1-5 & 7 measured in AC07R(spatial coverage,HS236-8043 attached)are larger than specified in GSFC 400.8-D210 paragraph 3.2.3 in the along track direction, the cross track direction or both. The measured and specified IFOV sizes are given below. All values in μ-radians.

	MIN.	AVG.	MAX.	SPEC.
Bands 1-4				
along track	42.70	44.12	45.92 ≤ 43.2	(Reference:FR5774)
cross track	43.58	44.74	46.29 ≤ 43.2	
Bands 5 & 7				
along track	46.44	48.69	51.35 ≤ 46.35	
cross track	44.45	44.99	45.79 ≤ 46.35	(spec met)

24. NEED FOR DEVIATION/WAIVER
Correcting the IFOV dimensions to the current specification would require disassembly of the TM optical system and focal plane assemblies. The IFOV sizes are only slightly out of specification (~5%) and will not adversely affect system performance. The square wave response for all bands exceeds specifications (BL16/17 report to be published), proving that the dynamic response of the system is very good and meets the usage requirement for which it was designed. The uncertainty associated with the AC07 measurements is of the same magnitude as the deviation from the specification. The performance of the Prototflight Thematic Mapper was very similar to the performance of the Flight Model (See Waiver W-106 attached).

REA [signature] SYS ENGR [signature] PE [signature] 8/10/82 QA [signature] 8/10/82 PE [signature] 8/11/82

25. PRODUCTION EFFECTIVITY BY SERIAL & LOT
51065 S/N 003

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE [signature]

** Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [ ] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY | SIGNATURE | DATE

DD FORM SEC 1694

Program Instruction 010

ORIGINAL PAGE IS
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REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR -481 FOR INSTRUCTIONS)

DATE PREPARED
11 August 1982

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Raymond A. Amador B12 MS 28 X6251

2. [✓ DEVIATION] WAIVER
3. MINOR [✓ MAJOR] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F1	11323	TM	W-171 (R1)

5. BASE LINE AFFECTED: [✓ FUNCTIONAL] ALLOCATED PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: YES [✓ NO]

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM		TP32015-632	NG
b. ITEM		(R1) [illegible]	[illegible]
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.
[illegible]			

9. TITLE OF DEVIATION/WAIVER
Change of Flight Acceptance Sine Vibration Levels In Thrust Axis

10. CONTRACT NO. & LINE ITEM

11. CONFIGURATION ITEM NOMENCLATURE
Radiometer

CLASSIFICATION OF DEFECT

12. CD NO.

13. DEFECT NO.

14. DEFECT CLASSIFICATION: MINOR [✓ MAJOR] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Radiometer

16. PART NO. OR TYPE DESIG.
51065 - J

17. LOT NO.

18. QTY
1

19. RECURRING DEVIATION/WAIVER: YES [✓ NO]

20. EFFECT ON COST/PRICE
NONE

21. EFFECT ON DELIVERY SCHEDULE
N/A

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
NONE

23. DESCRIPTION OF DEVIATION/WAIVER

Change Thrust Asix (X) Flight Acceptance Vibration Levels.

WAS: Freq. (Hz)	g pk	IS: Freq. (Hz)	g pk
5 - 13.1	0.64 IN D.A.	5 - 11.1	0.64 IN D.A.
13.1 - 50	5.6	11.1 - 50	4.0
50 - 100	2.4	50 - 100	2.4

24. NEED FOR DEVIATION/WAIVER

Technical direction from GSFC per Telecon wiht O. Weinstein on 11 August 1982.

[illegible] 8/11/82

REA [illegible] SYS ENGR [illegible] QA [illegible] 8-11-82

PE [illegible] 8-11-82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065 SERNO 003 only ✓

[illegible] 8-7 [illegible] 9/9/82

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE
[illegible]

TITLE
Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. APPROVAL RECOMMENDED

b. [✓ APPROVED] DISAPPROVED

c. GOVERNMENT ACTIVITY

SIGNATURE [illegible] DATE [illegible]

DD FORM 1694

REQUEST FOR DEVIATION/WAIVER (See MIL-STD-480 or 481 for instructions)

DATE PREPARED: 8/9/82

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS: Hughes Aircraft Co, El Segundo, CA

1. [ ] DEVIATION [X] WAIVER

2. [X] MINOR [ ] MAJOR [ ] CRITICAL

3. DESIGNATION FOR DEVIATION/WAIVER				4. BASE LINE AFFECTED	5. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED
a. MODEL/TYPE	b. SER. CODE	c. SYS. DESIG.	d. DEVIATION NO.	[ ] FUNC. PHYSICAL [ ] ALLOCATED [ ] PRODUCT	[ ] YES [X] NO
SPARE		T.M.	W-172		

7. SPECIFICATIONS AFFECTED/TEST PLAN				8. DRAWINGS AFFECTED			
	GOVT. CODE	SPEC/DOC. NO.	CON	GOVT. CODE	NUMBER	REV	CON NO.
a. SPECIFICATION							
b. STD	82577	TS 32015-031					
c. TEST PLAN							

9. TITLE OF DEVIATION/WAIVER: Hybrid 3905973 S/N 535 High Temperature Settling Time

10. CONTRACT NO. & LINE ITEM: NAS5-24200

11a. CONFIGURATION ITEM NOMENCLATURE: Multiplexer

11b. CLASSIFICATION OF DEFECT: 12. ED NO. | 13. DEFECT CD. | 14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	16. PART NO. OR TYPE DESIG.	17. LOT NO.	18. QTY	19. REQUIRING DEVIATION/WAIVER
Analog Multiplexer Hybrid	3905973	S/N 535	1	[ ] YES [X] NO

20. EFFECT ON COST/PRICE: None

21. EFFECT ON DELIVERY SCHEDULE: 2 month schedule slip of spare hybrid if disa

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.: None

23. DESCRIPTION OF DEVIATION/WAIVER

Analog Multiplexer hybrid microcircuit 3905973, S/N 535 only, fails paragraph 4.7 of test specification TP 3905973 at high temperature (80°C) only. This paragraph covers settling time, should be 20 Nanoseconds max, is 26 nanoseconds. S/N 535, which is a spare hybrid, passes all specifications at all other temperatures.

The effect of using this hybrid in a system would be a very slight increase in the crosstalk between some sensors in the band where the hybrid was used. The crosstalk increase would be a maximum of one quantum step for a scene of full scale contrast only when the hybrid was at a temperature of 80° C. Since edges of full scale contrast are rare or nonexistent in real scenes and since the hybrid never reaches 80°C, no real effect would be anticipated.

24. NEED FOR DEVIATION/WAIVER

Repair and retest of the hybrid to comply with the high temperature settling time specification would cost approx. $2,000 and delay the delivery of the hybrid by 2 months. Since the settling time as is would not significantly affect instrument performance, a lloving use of the hybrid as is is requested.

REA R L Julian Sys Engr J H Engel PE Kenneth D Hansen 8/13/82 QA W W Wiley 8/13/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER: Hybrid 3905973 S/N 530 only. Spare hybrid.

26. SUBMITTING ACTIVITY AUTHORIZED SIGNATURE / TITLE: R L Julian for J H Engel 8/13/82

27. APPROVAL/DISAPPROVAL

[ ] APPROVAL RECOMMENDED [X] APPROVED [ ] DISAPPROVED

a. GOVERNMENT ACTIVITY: NASA GSFC

SIGNATURE: Edward B. Smith DATE: 8/26/82

DD FORM 1694

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REQUEST FOR DEVIATION/WAIVER
(SEE REVERSE SIDE FOR INSTRUCTIONS)

DATE PREPARED: 20 Aug 82

PROGRAM ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center/S. G. Oxley
75 Coromar Drive, Goleta, CA 93117

2. [ ] DEVIATION [X] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITIC

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. M/R CODE	c. SYS DESIG.	d. DEVIATION NO.
F1	11525	TM	W173

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	M/R CODE	SPEC./DOC NO.	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	MOD. NO.
11525	50904	G	4072A

9. TITLE OF DEVIATION/WAIVER
Telescope Baseplate Temperature Channel Deletion

10. CONTRACT NO. & LINE
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper

12. CD NO.

13. DEFECT NO.

14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITIC

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper

16. PART NO. OR TYPE DESIG.
51065

17. LOT NO.
003

18. QTY
1

19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE
Approximately $1 Million

21. EFFECT ON DELIVERY SCHEDULE
3-Month schedule impact if disapproved.

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
Delete the requirement to provide a telescope baseplate temperature telemetry channel. (Reference Failure Report F2718.)

24. NEED FOR DEVIATION/WAIVER
The telemetry channel is an open circuit; repair would entail unnecessary risk since the channel loss has no significant mission effect. Temperature of baseplate can be deduced from other temperatures such as the telescope housing and the cal lamp housing.

REA [signature] 8/25/82 SYS ENGR [signature] 8/25/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065, S/N 003 only

26. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE [signature] TITLE Systems Engineering [signature]

27. APPROVAL/DISAPPROVAL

a. [X] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY
LRSD AT-D PO

SIGNATURE [signature] DATE 9/16/82

DD FORM 1694 O.K. to proceed pending final approval by GSFC CCB at Goddard.
G. B. Gist
NASA RTOM

REQUEST FOR DEVIATION/WAIVER
(See MIL-STD-480 or 481 for instructions)

DATE PREPARED: 8/31/82

ORIGINATING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [ ] DEVIATION [X] WAIVER

3. [ ] MINOR [X] MAJOR [ ] CRITIC

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR. CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
TM	11323	F-1	W174

5. BASE LINE AFFECTED: [X] FUNCTIONAL [ ] ALLOCATED [ ] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	REV.
a. SYSTEM	GSFC	400.8-D-210	
b. ITEM			
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	QTY.	DOC. NO.
11323	51065	J	4257,3037,4487 4679,4937,4643

9. TITLE OF DEVIATION/WAIVER
Out-of-field response

10. CONTRACT NO. & LINE
NAS5-24200

11. IDENTIFICATION TYPE NOMENCLATURE
Thematic Mapper Assembly

12. CI NO. | 13. EFFECT NO. | 14. EFFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITIC

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper

16. PART NO. OR TYPE DESIG.
51065

17. LOT NO.
003

18. QTY
1

19. REQUIRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE
Greater than $1,000,000.00

21. EFFECT ON DELIVERY SCHEDULE
One year

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER

GSFC 400.8-D-210, Section 3.2.3, requires that the response to the same point source shall be less than 1% at angular distances equal to or greater than two IFOV's. A slit source was used instead of a point source and the observed response is between 0.8% and 3.4%, depending on the detector and direction of displacement (reference Failure Report F5774).

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24. NEED FOR DEVIATION/WAIVER

To correct the above out-of-specification condition would require changes to the FPA and possible changes to the TM Optical assembly, causing considerable schedule delay and program cost increases. Per Waiver 105, the protoflight data was similar.

REL [signature] 9/1/82

QA [signature]

REA [signature] SYS ENG [signature] 9/1/82 PE [signature]

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
Thematic Mapper, P/N 51065, S/N 003

26. QUALIFYING ACTIVITY AUTHORIZING SIGNATURE: F R Williams
TITLE: Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [ ] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY | SIGNATURE | DATE

DD FORM 1694

☆ GPO: 1969 — 348 1

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REQUEST FOR DEVIATION/WAIVER
(SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED

PROCURING ACTIVITY NO.

1 ORIGINATOR NAME AND ADDRESS
THEMATIC MAPPER, SSRC

2. ☐ DEVIATION ☒ WAIVER
3 ☒ MINOR ☐ MAJOR ☐ CRITICAL

4 DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS DES'G.	d. DEV/WAIVER NO.
F1	11323	TM	W175

5 BASE LINE AFFECTED: ☐ FUNCTIONAL ☐ ALLOCATED ☐ PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: ☐ YES ☐ NO

7 SPECIFICATIONS AFFECTED-TEST PLAN

	MFR CODE	SPEC /DOC. NO.	SCN
a. SYSTEM			
b. ITEM	11323	TP32015-625	REV. C
c. TEST PLAN			

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
TEST PROCEDURE CHANGE - BUS VOLTAGE

10 CONTRACT NO. & LINE ITEM
NAS5-24200

11 CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER ASSEMBLY

CLASSIFICATION OF DEFECT

12 CD NO.	13. DEFECT NO	14. DEFECT CLASSIFICATION
		☐ MINOR ☐ MAJOR ☐ CRITICAL

15 NAME OF PART OR LOWEST ASSEMBLY AFFECTED: THEMATIC MAPPER
16 PART NO OR TYPE DESIG.: 51065
17 LOT NO.: 003
18 QTY: 1
19 RECURRING DEVIATION/WAIVER: ☐ YES ☒ NO

20 EFFECT ON COST/PRICE
NONE

21 EFFECT ON DELIVERY SCHEDULE
NONE

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
NONE

23 DESCRIPTION OF DEVIATION/WAIVER
TEST SEGMENT 2 OF TP32015-625 WAS CONDUCTED AT A BUS VOLTAGE OF 28 VOLTS; PROCEDURE REQUIRED 23 VOLTS. SUBSEQUENT TESTS WERE SUCCESSFULLY CONDUCTED AT 23 VOLTS. SUCCESSFUL COMMAND FILE WAS TVCPLX6.DSG @ AT 1247 ON 4 SEPTEMBER 1982.

24 NEED FOR DEVIATION/WAIVER
PROCEDURE NOT FOLLOWED.

REL [signature] 9/4/82
QA [signature] for W.B. Adams 9/4/82
PE [signature] for L. Watson 9/4/82
REA [signature] SYS. ENG. [signature] CO, MD [signature] for John 9/3/82

25 PRODUCTION EFFECTIVITY BY SERIAL NUMBER

26 SUBMITTING ACTIVITY AUTHORIZING SIGNATURE | TITLE

27 APPROVAL/DISAPPROVAL

a. ☐ APPROVAL RECOMMENDED
b. ☒ APPROVED ☐ DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC
SIGNATURE: George B. Scott
DATE: 9/5/82

DD FORM 1694

Engineering	Reliability	Quality	Production	Test

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 9/7/82

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive, Goleta, CA 93117

2. [ ] DEVIATION [X] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	TM	W176

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [ ] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN	11323	TP32015-625	Rev. C

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOM. NO.

9. TITLE OF DEVIATION/WAIVER
Test procedure change.

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
F-1 Thematic Mapper

CLASSIFICATION OF DEFECT

12. CD NO. 2 | 13. DEFECT NO. | 14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper

16. PART NO. OR TYPE DESIG.: 51065

17. LOT NO.: 003

18. QTY: 1

19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE: None

21. EFFECT ON DELIVERY SCHEDULE: None

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER

1. TV TS5 ORB 07: BL 19/20 Mini 3B deleted.

2. TV TS6 ORB 09: BL 19/20 Mini 4B deleted.

24. NEED FOR DEVIATION/WAIVER

To conduct tests; requested by NASA GSFC, Within the normal timeline of the thermal vacuum orbital sequence. STR F1 029 Back-up Mode Cal Test (TVTS5), STR F-1 033 A/D Converter Test (TVTS6). to be run in lieu of TVTS5 ORB 7 and TVTS6 ORB 9

REA Kalcounis 9/7/82

QA [signature] 9/7/82

REL [signature] SYS ENGR J.L. Engel PE [signature]

Concur J.A. Jackson 9/8/82

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
51065, S/N 003 only.

26. SUBMITTING OR AUTHORIZING SIGNATURE: J.L. Engel 9/7/82

TITLE: Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL/DISAPPROVAL

a. [ ] APPROVAL RECOMMENDED

b. [X] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: NASA GSFC

SIGNATURE: George B. Gibbs DATE: 9/7/82

DD FORM SEC 18 1694

Program Instruction 010

REQUEST FOR DEVIATION/WAIVER (SEE MIL-STD-480 OR 481 FOR INSTRUCTIONS)

DATE PREPARED: 9.8.82

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Santa Barbara Research Center
75 Coromar Drive Goleta, CA. 93117

2. [ ] DEVIATION [X] WAIVER

3. [X] MINOR [ ] MAJOR [ ] CRITICAL

4. DESIGNATION FOR DEVIATION/WAIVER

a. MODEL/TYPE	b. MFR CODE	c. SYS. DESIG.	d. DEV/WAIVER NO.
F-1	11323	TM	W-177

5. BASE LINE AFFECTED: [ ] FUNCTIONAL [ ] ALLOCATED [X] PRODUCT

6. OTHER SYSTEMS/CONFIGURATION ITEMS AFFECTED: [ ] YES [X] NO

7. SPECIFICATIONS AFFECTED-TEST PLAN

	MFR. CODE	SPEC./DOC. NO.	SCN
a. SYSTEM			
b. ITEM			
c. TEST PLAN	11323	TP32015-625	Rev. C

8. DRAWINGS AFFECTED

MFR. CODE	NUMBER	REV.	NOR. NO.

9. TITLE OF DEVIATION/WAIVER
Thermal Vacuum Sequence/Procedure Change

10. CONTRACT NO. & LINE ITEM
NAS5-24200

11. CONFIGURATION ITEM NOMENCLATURE
F-1 Thematic Mapper

12. CD NO. 2

13. DEFECT NO.

14. DEFECT CLASSIFICATION: [X] MINOR [ ] MAJOR [ ] CRITICAL

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper

16. PART NO. OR TYPE DESIG.: 51065

17. LOT NO.: 003

18. QTY: 1

19. RECURRING DEVIATION/WAIVER: [ ] YES [X] NO

20. EFFECT ON COST/PRICE
None

21. EFFECT ON DELIVERY SCHEDULE
None

22. EFFECT ON INTEGRATED LOGISTIC SUPPORT, INTERFACE, ETC.
None

23. DESCRIPTION OF DEVIATION/WAIVER
Delete from TVTS60RBØ8 (BL19/20 Mini 4A). Resequence TVTS60RB12 (SRT-PRIM), ORB13 (SRT-REDN), and ORB14 (SRT-SCNL) to follow TVTS60RBØ7 (BL17).

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24. NEED FOR DEVIATION/WAIVER
To conduct tests; requested by NASA GSFC and SBRC System Engineering, within the normal timeline of the Thermal Vacuum Performance Test. The tests will consist of various STR's which will encompass a greater area of parameters obtained throughout the T/V test phase and will also allow for revisiting tests which have been conducted throughout the normal sequence of testing.

REA [signature] 9/8/82 SYS ENGR [signature] PE [signature] QA [signature]

25. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
P/N 51065 S/N 003 ONLY

26. SUBMITTING ACTIVITY AUTHORIZED SIGNATURE

Minor - System Engineering
Major/Critical - Program Manager

27. APPROVAL SUGGESTED

a. [✓] APPROVAL RECOMMENDED

b. [✓] APPROVED [ ] DISAPPROVED

c. GOVERNMENT ACTIVITY: LANDSAT-D

SIGNATURE: [signature] DATE: 9-3-82

DD FORM 1694

4.3 ENGINEERING CHANGE PROPOSALS

The following are copies of Engineering Change Proposals (ECP) submitted for the Flight Model Thematic Mapper.

ENGINEERING CHANGE PROPOSAL, PAGE 1
(SEE MIL-STD-480 FOR INSTRUCTIONS)

DATE PREPARED: 18 July 1978

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company, S&CG
P.O. Box 92919 - Airport Station, Los Angeles, CA 90009

2. CLASS OF ECP: 1

3. JUST. CODE: B

4. PRIO: R

5. ECP DESIGNATION

a. MODEL/TYPE	b. MFR CODE	c. SYS DESIG.	d. ECP NO.	e. TYPE	f. REV.	g. CORR
N/A	82577	HS236	02	P	--	--

6. BASELINE AFFECTED: ☐ FUNCTIONAL ☐ ALLOCATED ☐ PRODUCT

7. OTHER SYS/CONFIG ITEMS AFFECTED: ☐ YES ☒ NO

8. SPECIFICATIONS AFFECTED - TEST PLAN

	MFR CODE	SPEC/DOC NO	SCN
a. SYSTEM	82577	TP32015-500/A	
b. ITEM			
c. TEST PLAN			

9. DRAWINGS AFFECTED

MFR CODE	NUMBER	REV	NOR NO.

10. TITLE OF CHANGE
System Test Plan, Revision A TP32015-500

11. CONTRACT NO & LINE ITEM
NAS5-24200

12. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper System (3533000-100)

13. IN PRODUCTION: ☐ YES ☒ NO

14. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper System

15. PART NO OR TYPE DESIGNATION
3533000-100

16. DESCRIPTION OF CHANGE
Revise TP32015-500 System Test Plan

17. NEED FOR CHANGE
Per ECR 664618

18. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
1 & Up

19. EFFECT ON PRODUCTION DELIVERY SCHEDULE
NONE

20. RETROFIT

a. RECOMMENDED ITEM EFFECTIVITY
N/A

c. SHIP/VEHICLE CLASS AFFECTED
N/A

b. ESTIMATED KIT DELIVERY SCHEDULE
N/A

d. LOCATIONS OR SHIP/VEHICLE NUMBERS AFFECTED
N/A

21. ESTIMATED COSTS/SAVINGS UNDER CONTRACT

22. ESTIMATED NET TOTAL COSTS
NONE

23. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE
L.E. Blanchard

TITLE
HS236 Program Manager

24. APPROVAL/DISAPPROVAL

a. CLASS I
☒ APPROVAL RECOMMENDED

b. CLASS II
☐ APPROVED ☐ DISAPPROVED ☐ CONCUR IN CLASSIFICATION OF CHANGE ☐ DO NOT CONCUR IN CLASSIFICATION OF CHANGE

c. GOVERNMENT ACTIVITY

SIGNATURE

DATE

DD FORM 1692

☆ GPO 1980 — 848 785/023

ENGINEERING CHANGE PROPOSAL, PAGE 2
(SEE MIL-STD-480 FOR INSTRUCTIONS)

PROCURING ACTIVITY NO

ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company, S&CG
P.O. Box 92919 - Airport Station, Los Angeles, CA 90009

ECP NUMBER
002

EFFECTS ON FUNCTIONAL/ALLOCATED CONFIGURATION IDENTIFICATION

25 OTHER SYSTEMS AFFECTED
NONE

26. OTHER CONTRACTORS/ACTIVITIES AFFECTED
NONE

27 CONFIGURATION ITEMS AFFECTED
THEMATIC MAPPER

28. EFFECTS ON PERFORMANCE ALLOCATIONS AND INTERFACES IN SYSTEM SPECIFICATIONS

N/A

29 EFFECTS ON EMPLOYMENT INTEGRATED LOGISTIC SUPPORT TRAINING, OPERATIONAL EFFECTIVENESS ETC

N/A

30 EFFECTS ON CONFIGURATION ITEM SPECIFICATIONS

N/A

31 DEVELOPMENTAL REQUIREMENTS AND STATUS

N/A

32 TRADE OFFS AND ALTERNATIVE SOLUTIONS

N/A

8/15/78
33 DATE BY WHICH CONTRACTUAL AUTHORITY IS NEEDED

DD FORM 1 DEC 68 1692-1

☆ GPO 1968 — 343 763, 626

ENGINEERING CHANGE REQUEST

HUGHES
CODE IDENT 82577

ECR NO. No 66461

SHEET 1 OF 1

REQUEST

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(S)
THEMATIC MAPPER	SYSTEM	TEST PLAN 3533000-100	TP32015-500

DESCRIPTION OF PROBLEM

TEST PLAN REQUIRES UPDATE FOR DELETION OF STM AND OTHER CHANGES IN TEST REQUIREMENTS

PROPOSED SOLUTION

REVISE PLAN

ORIGINAL PAGE IS
OF POOR QUALITY

REQUESTED BY	EXT	BLDG./MS	ORG CODE	DATE	URGENCY
EB Van Horne			44-29	5/2/78	COMPLETE FOR DDR
APPROVED					
APPROVED					

RECM EFF	RECM DISP OF ITEM
S/N 1&UP	N/A

DISPOSITION

☒ ACCEPTED
☐ REJECTED

REASON FOR REJECTION

DATE RECD IN ECC	SCH REPLY DATE	AD
5/2/78		

CHANGE CLASS	SPECIFICATION OR CONTROL ITEM	RESP SPEC ACT. OR RESP ENGRG ACT.	ECA NUMBER
☒ I ☐ IIA ☐ IIB			
DOCUMENT NO.(S) FOR IIB CHANGE	TP32015-500	STEFFEN	467026

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	
			RESP SPEC ACT.			PROGRAM MGMT EB Van Horne	44-29	5/

CLASS IIB RELEASE AUTHORIZATION

CHANGE EFFECTIVITY	CONTRACT NO.	MANUFACTURING
DISPOSITION OF ITEMS	CUSTOMER DATE	ENGRG CHANGE CTR

9252 CS OCT 72

APPROVED OUTSIDE CRB 5/2/78
CRB 5/9/78

HUGHES
HUGHES AIRCRAFT COMPANY
CODE IDENT 82577

HUGHES
SPECIFICATION CHANGE NOTICE

SPECIFICATION TITLE	SYSTEM TEST PLAN. REVISION A	SPEC NO. TF 3205-5xx	REV A
EFFECTIVITY	S/N 1 thru 4	AUTHORITY (E.C.A. OCN NO.) FA 4616 : CLI	SCN NO. DVC
SYSTEM/EQUIPMENT	THERMAL INFRARED		DATE 8-1-78

THIS NOTICE INFORMS RECIPIENTS THAT THE SPECIFICATION IDENTIFIED BY THE NUMBER (AND REVISION LETTER OR NUMERAL) SHOWN ABOVE HAS BEEN CHANGED. THE PAGES CHANGED BY THIS SCN BEING THOSE FURNISHED HEREWITH AND CARRYING THE SAME DATE AS THIS SCN. THE PAGES OF THE PAGE NUMBERS AND DATES LISTED BELOW IN THE SUMMARY OF CHANGED PAGES, COMBINED WITH NON-LISTED PAGES OF THE ORIGINAL ISSUE OF THE REVISION SHOWN ABOVE CONSTITUTE THE CURRENT VERSION OF THIS SPECIFICATION

SCN NO.	PAGES CHANGED (INDICATE DELETIONS)	*S	*A	DATE
DVC	ENTIRE SYSTEM TEST PLAN REVISED			8-1-7
	ALL PAGES	X		

ORIGINAL PAGE IS
OF POOR QUALITY

	ORG CODE	DATE	RESPONSIBLE SPEC ACTIVITY	ORG CODE	DAT
				45-74	7/31
	ORG CODE	DATE	RELEASED BY	ORG CODE	DAT

13087 CB NOV 71

*"S" INDICATES SUPERSEDES EARLIER PAGE "A" INDICATES ADDL

ENGINEERING CHANGE ANALYSIS SHEET 1

HUGHES — CODE IDENT 82577

☒ COMPLETE ☐ ADVANCE — SH 1 OF 1

PROGRAM	SYS/EQUIP NAME OR DLS	CONTROL ITEM NAME & NO.	ECR NO.
THEMATIC MAPPER HS 236	SYSTEM	PLAN [illegible]	66457
			CONTRACT NO. NAS5-[illegible]

IEC.	CLASS	URGENCY	RELATED ECA NO. (S)
1			—

BASE LINE AFFECTED

PRODUCT BASE LINE AFFECTED AND CHANGE IS: ☒ PRODUCTION ONLY ☐ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DELETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	D LET
TP 2215-500		1 E/ A					

TITLE OF CHANGE: SYSTEM [illegible]

RELATED FACTORS ON SH 2 ARE AFFECTED ☐ YE ☒ NO

DESCRIPTION OF CHANGE

[illegible]

JUSTIFICATION FOR CHANGE

[illegible]

ORIGINAL PAGE IS OF POOR QUALITY

EXTENT OF TESTING

[illegible]

RECM CHANGE EFFECTIVITY

[illegible]

RECM DISPOSITION OF ITEMS

[illegible]

APPROVAL FOR EVALUATION

	ORG CODE	DATE		ORG CODE	DATE	REQUIRED:
G. A. Ryan	72LC [illegible]	[illegible]	[illegible]	45-74	7/26/78	
R L Julian	41-41	8/15/78	DEPARTMENT MGR [illegible]	44-29	8/16/78	ECAE ☐ YES ☒
William D Hurd	76 [illegible]	[illegible]	CONFIG MGMT OFFICE C A McCann	44-27	8/24/8	MAEC ☐ YES ☒
L L Cain	75-21	8/5/78	PROGRAM MANAGER [illegible]	[illegible]	8/17/78	SAEC ☐ YES ☒

CHANGE APPROVAL

		ORG CODE	DATE		ORG CODE	DAT
☐ APPROVED						
☐ REJECTED						
				CHANGE REVIEW BOARD CHM		

AUTHORIZATION FOR RELEASE

SAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
	1			
CONTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE CTR	DATE

9253A CS OCT 72

ENGINEERING CHANGE PROPOSAL, PAGE 1
(SEE MIL-STD-480 FOR INSTRUCTIONS)

DATE PREPARED: 9/18/78

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
HUGHES AIRCRAFT CO., P.O. BOX 92919 - AIRPORT STATION
LOS ANGELES, CA 90009

2. CLASS OF ECP: 1

3. JUST. CODE: B

4. $: $

5. ECP DESIGNATION

a. MODEL/TYPE	b. MFR CODE	c. SYS DESIG	d. ECP NO.	e. TYPE	f. REV.	g. CORR
N/A	82577	HS236	03	F		

6. BASELINE AFFECTED: ☐ FUNCTIONAL ☐ ALLOCATED ☐ PRODUCT

7. OTHER SYS/CONFIG ITEMS AFFECTED: ☐ YES ☒ NO

8. SPECIFICATIONS AFFECTED - TEST PLAN

	MFR CODE	SPEC/DOC NO	SCN
a. SYSTEM	82577	3533000-400/A	
b. ITEM			
c. TEST PLAN			

9. DRAWINGS AFFECTED

MFR CODE	NUMBER	REV.	NOR NO

10. TITLE OF CHANGE
REVISION "A" OF 3533000-400

11. CONTRACT NO & LINE ITEM
NAS 5-24200

12. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER SYSTEM (3533000-100)

13. IN PRODUCTION: ☐ YES ☒ NO

14. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
THEMATIC MAPPER SYSTEM

15. PART NO OR TYPE DESIGNATION
3533000-100

16. DESCRIPTION OF CHANGE
REVISE INTERFACE CONTROL DRAWING

17. NEED FOR CHANGE
IMPROVEMENT OF THE INTERFACE DEFINITION

18. PRODUCTION EFFECTIVITY BY SERIAL NUMBER
1 & UP

19. EFFECT ON PRODUCTION DELIVERY SCHEDULE
NONE

20. RETROFIT

a. RECOMMENDED ITEM EFFECTIVITY
N/A

c. SHIP/VEHICLE CLASS AFFECTED
N/A

b. ESTIMATED KIT DELIVERY SCHEDULE
N/A

d. LOCATIONS OR SHIP/VEHICLE NUMBERS AFFECTED
N/A

21. ESTIMATED COSTS/SAVINGS UNDER CONTRACT

22. ESTIMATED NET TOTAL COSTS
NONE

23. SUBMITTING ORGANIZATION AUTHORIZED SIGNATURE
X L.E. BLANCHARD

TITLE
HS236 PROGRAM MANAGER

24. APPROVAL/DISAPPROVAL

a. CLASS I: ☐ APPROVAL RECOMMENDED

b. CLASS II: ☐ APPROVED ☐ DISAPPROVED ☐ CONCUR IN CLASSIFICATION OF CHANGE ☐ DO NOT CONCUR IN CLASSIFICATION OF CHANGE

c. GOVERNMENT ACTIVITY

SIGNATURE

DATE

DD FORM 1692

☆ GPO 1969 — 843 783/023

bcc: LE Blanchard, EW Wilkins, JL Sharp, Data Bank HS236 (2), File

HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

In reply refer to: 78(44)21820/D4596
HS236/0019-0414

26 September 1978

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Mr. J. E. Firmin
Procurement Manager
Code 283/400.8

Subject: Contract NAS5-24200, Thematic Mapper; Engineering Change Proposal No. 3, ECA No. 467040

Pursuant to Article XIV, Configuration Management, subject ECP for Thematic Mapper Interface Control Drawing 3533000-400, Revision A is herewith submitted for GSFC review and approval.

The Interface Control Drawing has been revised and updated as follows:

1. Completed the definition of the TM instrument outline and extremities.
2. Clarified fields of view for radiative cooler, thermal radiators, sun calibrator, and scan mirror.
3. Added installation requirements and mounting details.
4. Added electrical interface connector designations, functions and locations.
5. Defined thermal requirements including thermal finishes.
6. Included current TM weight.
7. Added access requirements for purging, removal of protective covers, and requirements during testing and operations.
8. Revised the TM instrument coordinate system to be consistent with the requirement of GSFC 400.8-D-201.

There is no cost or schedule impact with this change.

Very truly yours,
HUGHES AIRCRAFT COMPANY

J. L. Sharp
Contract Negotiator, Sr.
NASA Systems Division

Copy of Drawing sent via [illegible]

cc: T. P. Sciacca, NASA Resident Representative
O. Weinstein, Code 400.8
L. Gonzales, Code 400.8
A. Hardesty, Code 283/400.8
J. Baniszewski, Code 283 (w/o encl.)

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES
CODE IDENT 81927

ECA NO. 467040 | REV
☒ COMPLETE ☐ ADVANCE | SH 1 OF

PRC	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECR NO.
THEMATIC MAPPER	THEMATIC MAPPER	THEMATIC MAPPER INTERFACE CONTROL DRAWING 3533000-400	664626
			CONTRACT NO. NAS 5-2420

RECM CLASS	URGENCY	RELATED ECA NO. (S)
I		----------

BASE LINE AFFECTED: 1 & UP

PRODUCT BASE LINE AFFECTED AND CHANGE IS:
☐ PRODUCTION ONLY ☒ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	LI
3533000-400		REV. "A"					

TITLE OF CHANGE
REVISE AND REDRAW TI INTERFACE CONTROL DRAWING

RELATED FACTORS ON SH 2 ARE AFFECTED ☐

DESCRIPTION OF CHANGE
REVISED AND REDRAWN TO INCORPORATE INTERFACE INFORMATION NOT PREVIOUSLY SPECIFIED.

JUSTIFICATION FOR CHANGE
INTERFACE DEFINITION NOT COMPLETE.

EXTENT OF TESTING: N/A

RECM CHANGE EFFECTIVITY: 1 & UP

RECM DISPOSITION OF ITEMS: N/A

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE	REQUIRED:
F. D. McLAUGHLIN	40-92	9/18/78		44-52	9-25-78	
W D Hand	46-20	Phone	DEPARTMENT MGR			ECAE ☐ YES ☒
			CONFIG MGMT OFFICE	44-27	9/25/8	MAEC ☐ YES ☒
			PROGRAM MANAGER	44-00-01	9/21/78	SAEC ☐ YES ☒

CHANGE APPROVAL

	ORG CODE	DATE		ORG CODE	DAT
☒ APPROVED					
☐ REJECTED			CHANGE REVIEW BOARD CHM	44-27	

AUTHORIZATION FOR RELEASE

PROPOSAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	LNGRG CHANGE CTR	DATE

Attachment 1

ENGINEERING CHANGE PROPOSAL (SHORT FORM) (SEE MIL-STD-481 FOR INSTRUCTIONS)	DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
		004	

2. ORIGINATOR NAME AND ADDRESS	3. ORIG. CODE	3. CLASS OF ECP	4. ACT. CODE	5. PRIORITY
Hughes Aircraft Company Culver City, California 90230	82577	I		

6. SPECIFICATIONS AFFECTED			7. DRAWINGS AFFECTED	
a. CODE	b. SPECIFICATION/DOCUMENT NO.	c. PER. CODE	d. NUMBER	e. REV.
		HAC	3533000-400	A

8. TITLE OF CHANGE	9. CONTRACT NO. & LINE ITEM
Revise Interface Control Drawing 3533000, and design to reflect (1) deletion of Nadir Thermal Louver, and (2) Modification to Thematic Mapper Mounting Feet	NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE	11. IN PRODUCTION
Thematic Mapper Interface Control Drawing 3533000-400	[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	13. PART NO. OR TYPE DESIGNATION
Main Frame	50840

14. DESCRIPTION OF CHANGE

1) Change mounting foot design to permit installation of the mounting bolts from the spacecraft side of the mechanical interface per GSFC request.

2) Remove Nadir Louver and all associated requirements including field-of-view and thermal finish requirements.

15. NEED FOR CHANGE

1) GSFC request.

2) Nadir Louver thermal performance does not justify the additional weight.

16. EFFECT ON ASSOCIATED EQUIPMENT

Assembly and testing fixtures, two (2) will be retrofitted to accommodate new foot design.

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
Engineering, Protoflight, and Flight Models	None
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED RIT DELIVERY SCHEDULE**
Engineering, Protoflight, and Flight Models	

21. ESTIMATED COSTS/SAVINGS

See Change Proposal No. 014

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
L. E. Blanchard	Thematic Mapper Program Manager

23. APPROVAL/DISAPPROVAL

Revision of ICD 35-3300 to reflect Items 14-1 and 14-2 is approved. Additio needed changes to ICD 35-3300A were provided by separate letter (D. Studenic

24. CURRENT ACTIVITY	SIGNATURE	DATE
NASA/GSFC, Landsat-D Project O. Weinstein, T.O. NAS5-24200	K. Cockerham Contracting Officer	3/24/7

DD FORM 1693 GA 4104.3A

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Engineering Change Proposal SHEET 2		ECP NO. 004	REV
		SHEET 2 OF 5	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-400	A	Changed to Rev. B					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES	X		OTHER SYSTEMS	X				
INTERCHANGEABILITY	X		INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT					

Proposed Thematic Mapper Interface Control Drawing (3533000-400, Rev. A) change.

1. *Issue Revision B to 3533000-400A per attached blueline prints (2).*

STATEMENT OF WORK

CHANGE NO. 1: CHANGE MOUNTING FOOT DESIGN

Task I. Design and Drawing

Conduct engineering design and analysis to specify new foot design. Issue new foot design drawing. Change existing assembly and interface drawings as necessary to incorporate the requirements of the new foot design.

Task II. Structural Mechanics Analysis

Conduct the following analysis:

A. Natural frequency and normal modes analysis for two cases which bound the results.

B. Modal random response analysis (protoflight levels) to predict launch loads using frequencies and modes computed in A above.

C. Self-induced transient analysis to predict on-oribt performance using frequencies and modes computed in A above.

D. On-orbit thermal distortion analysis based upon Task III.B below.

Task III. Thermal Analysis and Documentation

A. Revise the operational constraints summary and conduct analysis.

B. Revise thermal analysis summary assuming 75 percent power supply efficiency with new spacecraft interface. Incorporate spacecraft backloads into analysis.

Task IV. Assembly and Test Fixture

Conduct engineering design and analysis to specify the new retrofit requirements for the assembly and test fixture. Revise existing drawings as necessary to reflect foot design changes.

Task V. Procurement of TM Mounting Feet

Issue modification to subcontract and procure twelve (12) TM mounting feet of the revised design.

Task VI. Retrofit Machining of Assembly and Test Fixture

Issue modification to subcontract and retrofit machine two (2) assembly and test fixtures.

Task VII. Project Management and System Engineering

Provide Project Management and System Engineering supervision and direction for completion of the engineering effort.

CHANGE NO. 2: DELETE NADIR LOUVER

Change No. 2 is a no-cost change.

ENGINEERING CHANGE PROPOSAL (CONCEPT FORM) (See SSE-STD-481 FOR INSTRUCTIONS)

DATE PREPARED

ECP NO. 006 A

PROCURING ACTIVITY NO.

ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company
Culver City, California 90230

4. CONT. NO. 825TT

5. CLASS OF ECP I

6. PRIORITY

7. SPECIFICATIONS AFFECTED

SPEC. CODE	SPECIFICATION/DRAWING NO.	DOC. CODE	NUMBER	REV
		HAC	3533000-400	B

8. TITLE OF CHANGE
REVISE INTERFACE CONTROL DRAWING 3533000-400 TO REFLECT REQUESTED CHANGE TO LOCATIONS OF ELECTRICAL INTERFACE CONNECTORS J9 THROUGH J20 AND J24

9. CONTRACT NO. & LINE ITEM
NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER INTERFACE CONTROL DRAWING 3533000-400

11. IN PRODUCTION
[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
ELECTRONIC MODULE TOP COVER

13. PART NO. OR TYPE DESIGNATION
52360

14. DESCRIPTION OF CHANGE
RELOCATES ELECTRICAL INTERFACE CONNECTORS J9 THROUGH J20, AND J24; AND SPECIFIES MASTER POLARIZING KEYS FOR THESE CONNECTORS. SEE ATTACHED ENGINEERING CHANGE DOCUMENTATION; ECR 664537 A, and ECA 467236

ORIGINAL PAGE IS OF POOR QUALITY

15. NEED FOR CHANGE
PRESENT LOCATION OF CONNECTORS CANNOT BE ACCOMODATED BECAUSE OF EXTENSIVE REDESIGN OF THE TM ELECTRONICS MODULE STRUCTURE.

16. EFFECT ON ASSOCIATED EQUIPMENT
NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.
ENGINEERING, PROTOFLIGHT, AND FLIGHT MODELS

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
NONE

19. RECOMMENDED RETROFIT EFFECTIVITY
ENGINEERING, PROTOFLIGHT, AND FLIGHT MODELS

20. ESTIMATED KIT DELIVERY SCHEDULE
NONE

21. ESTIMATED COSTS/SAVINGS
THIS IS A "NO COST" ECP

22. ORIGINATING ACTIVITY'S SIGNATURE
B Rim Nome

TITLE
ASST PROG MGR TM

23. APPROVAL/DISAPPROVAL

CONCURRENCE ACTIVITY

SIGNATURE

DATE

DD FORM 1693 GA 4104.3A

(1)

ENGINEERING CHANGE REQUEST

HUGHES
CODE IDENT 62577

ECR NO. № 664537
SHEET 1 OF 3

REQUEST

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(S)
HS 236	THEMATIC MAPPER	3533000-100 THEMATIC MAPPER	INTERFACE CONTROL DRAWING 3533000-400

DESCRIPTION OF PROBLEM

Connector location interferes with electronic module structure

PROPOSED SOLUTION

See SBRC ECR attachments

REQUESTED BY	EXT	BLDG./M/S	ORG CODE	DATE	URGENCY
D. ROWLEY	4243	761/58	22/15	9/7/79	
APPROVED T.B. McLaughlin	83479	373	44-29	10-8-79	RECM EFF: 1 & up
APPROVED					RECM DISP OF ITEMS:

DISPOSITION

☒ ACCEPTED Implement
☐ REJECTED

REASON FOR REJECTION: ECP #6

DATE RECD IN ECC | SCH REPLY DATE | ADVA ☐

CHANGE CLASS ☒ I ☐ IIA ☐ IIB

DOCUMENT NO.(S) FOR IIB CHANGE

SPECIFICATION OR CONTROL ITEM	RESP SPEC ACT. OR RESP ENGRG ACT.	ECA NUMBER
	McLaughlin	467236

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	D
			RESP SPEC ACT.			PROGRAM MGMT	4429	10/1

CLASS IIB RELEASE AUTHORIZATION

CHANGE EFFECTIVITY	CONTRACT NO.	MANUFACTURING	D.
DISPOSITION OF ITEMS	CUSTOMER DATE	ENGRG CHANGE CTR	D

252 CS OCT 72

11/11, 9/25

SBRC ENGINEERING CHANGE REQUEST NO. _____

SHEET 2 OF 3

DRAWING TITLE	DRAWING NUMBER	REV
THEMATIC MAPPER INTERFACE CONTROL DRAWING	3533000-400	B

CLASS CHANGE	DRAWING TYPE	PRIORITY OF CHANGE	PROJECT NUMBER
☒ I ☐ II	☐ A ☐ B	☐ emergency ☐ urgent ☐ routine	

OTHER AFFECTED ENGINEERING DOCUMENTS

NONE

ORIGINAL PAGE IS OF POOR QUALITY

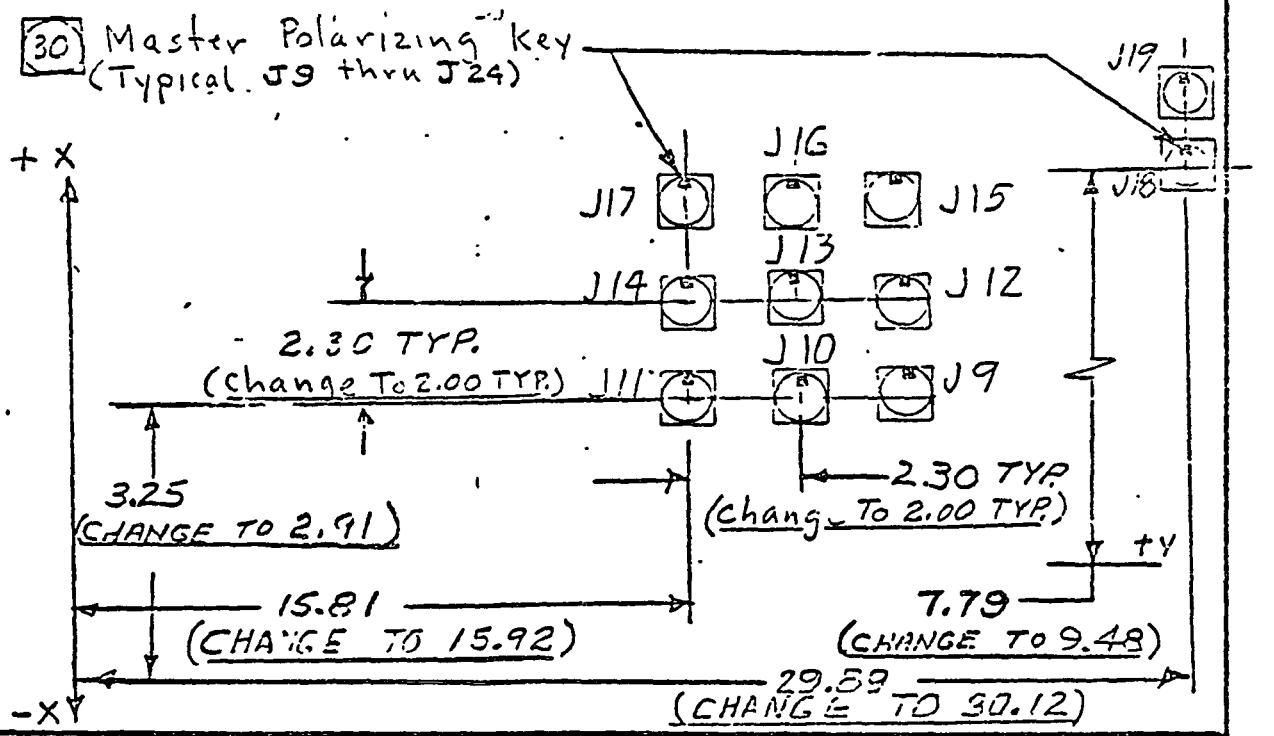
REASON CHANGE NEEDED (EXPLAIN IN FULL)

CONNECTOR LOCATION INTERFERES WITH ELECTRONIC MODULE STRUCTURE

NATURE OF PROBLEM AND/OR REQUIRED CHANGE

3533000-400 Page 3

PATTERN SHRINKS IN SIZE



REQUESTED BY	DATE	APPROVAL	DATE	VELLUM ISSUE APPROVED BY
T. BANKS	79-9-7	[signature]	79-9-7	☐ CD ☐ CMO _____
CMO REVIEWER	DATE	APPROVAL	DATE	ACTION TAKEN
		[signature]	10-7-79	E.O. _____ DWG. REV. ___
EFFECTIVITY		APPROVAL [signature]	DATE 10-5-79	
ITEM DISPOSITION		APPROVAL	DATE	INCORP BY / DATE / HRS REQ
REWORK ☐ ITEMS CONFORM ☐		APPROVAL	DATE	
NO ITEMS MADE ☐ REJECT ☐				CHECKED BY / DATE / HRS REQ
USE ☐ NOT APPLICABLE ☐		APPROVAL	DATE	

SBRC FORM NO. [illegible]

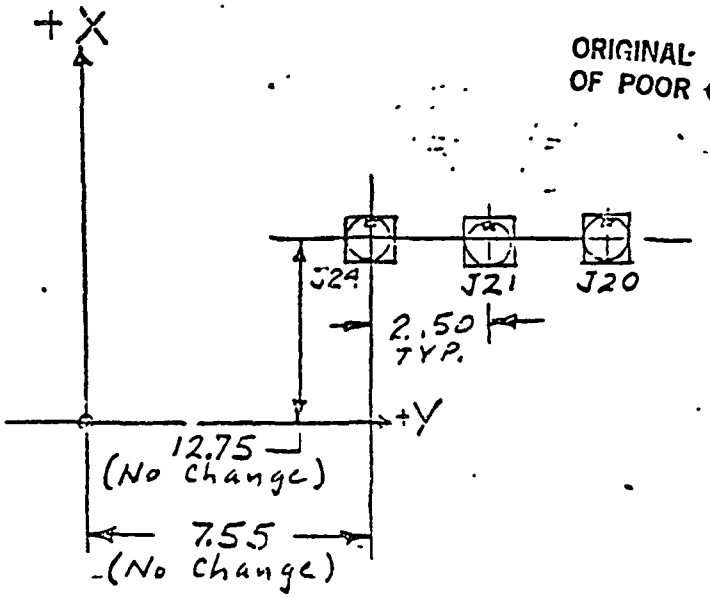
SBRC ENGINEERING CHANGE REQUEST NO. _____
SHEET 3 OF 3

DRAWING TITLE THERMATIC MAPPER INTERFACE CONTROL DRAWING

DRAWING NUMBER 3533000-400

REV

INFORMATION ENTERED HERE MUST BE IDENTIFIED BY THE APPROPRIATE BLOCK HEADING FROM SHEET 1



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Add Note 30:

"(30) Connectors J9 Thru J24 To Be Oriented With The Master Polarizing Key In The +X Direction."

Add Note 31:

"31 The Tolerance For Dimensions Locating Electrical Interface Connectors Shall Be ±0.06 inches."

SBRC FORM NO 067-8-2 (9-78)

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES

ECA NO. 467236 | REV

☒ COMPLETE ☐ ADVANCE | SH 1 OF 4

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECR NO / CONTRACT NO.
L-36	THEMATIC MAPPER	3533000-100	664537A

ECM CLASS	URGENCY	RELATED ECA NO. (S)
I	ROUTINE	

BASE LINE AFFECTED: 1 AND UP

PRODUCT BASE LINE AFFECTED AND CHANGE IS: ☐ PRODUCTION ONLY ☒ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DELETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DELETED
3523000-400 B		INCORPORATE IN REV C					

TITLE OF CHANGE
RELOCATION OF CONNECTORS

ORIGINAL PAGE IS OF POOR QUALITY

RELATED FACTORS ON SH 2 ARE AFFECTED ☐ YES ☐ NO

DESCRIPTION OF CHANGE
THE PATTERN FOR CONNECTORS J9 THRU J17 SHRINKS IN SIZE, CONNECTORS J18, J19 ARE MOVED FARTHER AWAY FROM THE Y AXIS IN THE +X DIRECTION. J20 & J24 have been relocated.

JUSTIFICATION FOR CHANGE
CONNECTOR LOCATIONS INTERFERE WITH ELECTRONICS MODULE STRUCTURE AS A RESULT OF STRUCTURAL REDESIGN

EXTENT OF TESTING
NONE

RECM CHANGE EFFECTIVITY
1 AND UP

RECM DISPOSITION OF ITEMS
NA

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE
D Smith	40-92	10/18/79			
M Yaughlin	44-29	10/18/79	DEPARTMENT MGR		
William B. Hood	46-20	11/13/79	CONFIG MGMT OFFICE Ken Johnson	44-29	11/20/79
			PROGRAM MANAGER		

REQUIRED:
ECAE ☐ YES ☒ NO
MAEC ☐ YES ☒ NO
SAEC ☐ YES ☒ NO

CHANGE APPROVAL

		ORG CODE	DATE		ORG CODE	DATE
☐ APPROVED						
☐ REJECTED				CHANGE REVIEW BOARD CHM	SBRC	11/27

AUTHORIZATION FOR RELEASE

PROPOSAL NO	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACT AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE CTR	DATE

GA CS OCT 78

ENGINEERING CHANGE ANALYSIS SHEET 2	HUGHES CODE IDENT 62577	ECA NO. 467236	REV
		SHEET 2 OF 4	

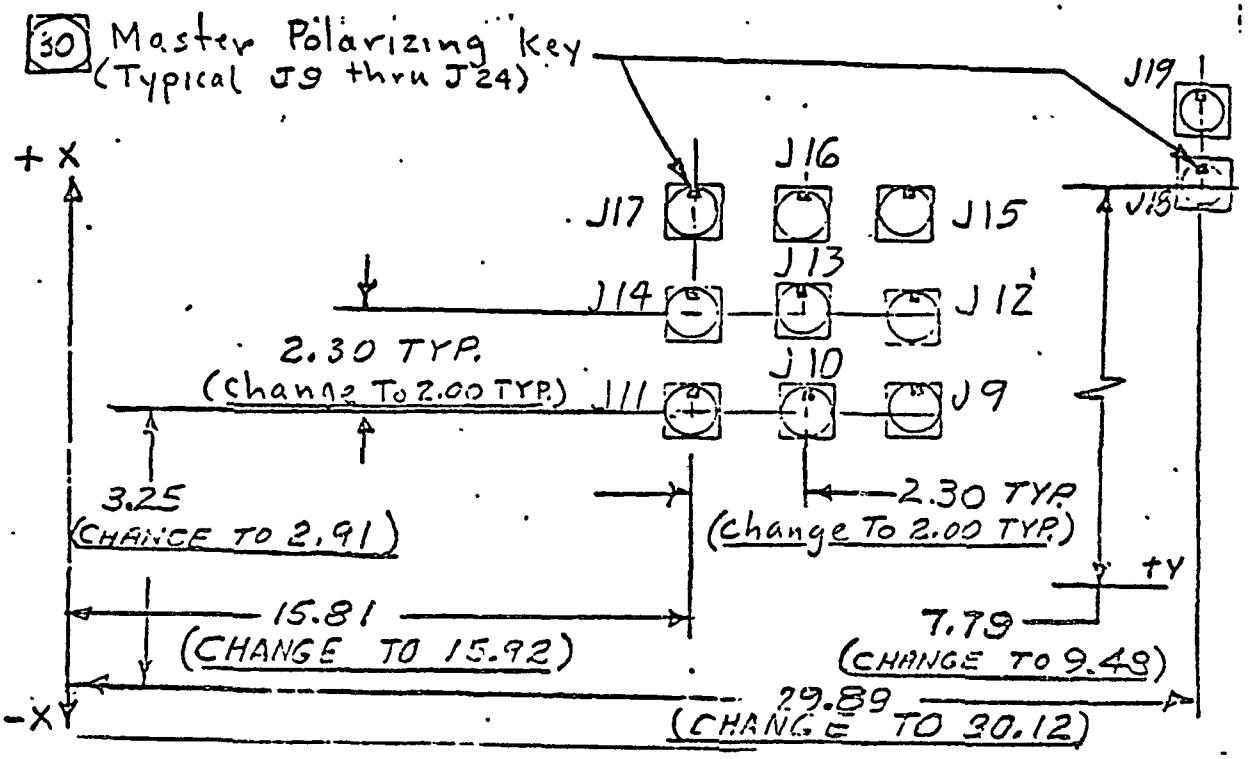
SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-100 B		INCORPORATE IN REV S					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES, EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION, CONTRACTUALLY APPLICABLE	X		CMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE	X		OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.	X		SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY	X		INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT	X				

Revise
3533000-400 Page 3 As shown



ECR/ECA/ECAE CONTINUATION SHEET	HUGHES HUGHES AIRCRAFT COMPANY CODE IDENT 62577	☐ ECR ☒ ECA ☐ ECAE	
		NO. 467236 REV	SH NO. 4 of 4

ALL INFORMATION ENTERED HEREON SHALL BE IDENTIFIED BY THE APPROPRIATE BLOCK HEADING FROM THE ECR, ECA, OR ECAE

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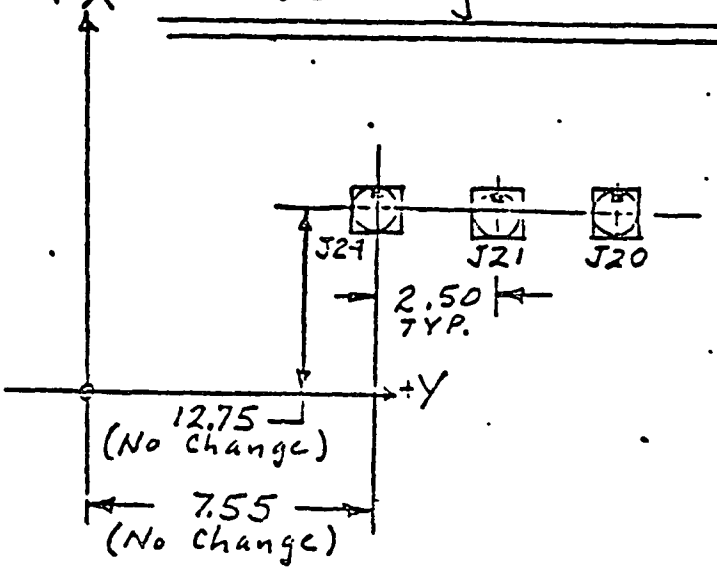
+X Revise Drwg # 3533000-400 Page 3 as shown.



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"31 The Tolerance For Dimensions Locating Electrical Interface Connectors Shall Be ±0.06 inches."

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ENGINEERING CHANGE PROPOSAL (SHORT FORM)
(SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED | ECP NO. 007 | PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company
Culver City, California 90230

2. MFR. CODE 82577 | 3. CLASS OF ECP | 4. JUST. CODE | 5. PRIORITY

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
	GSFC 400.8-D-210, HS236-6241			

8. TITLE OF CHANGE
DELETION OF BAND 6 MODULATION TEST (ACØ5R)

9. CONTRACT NO. & LINE ITEM
NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE
SYSTEM TEST

11. IN PRODUCTION
☐ YES [✓ NO]

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
N/A

13. PART NO. OR TYPE DESIGNATION

14. DESCRIPTION OF CHANGE

(1). CANCELL ACØ5R. VERIFY COMPLIANCE WITH THE BAND 6 MODULATION USING THE RESULTS OF UNIT LEVEL TESTS AND ANALYSIS (PER HS236-1381).

(2). CHANGE THE TOP LINE SPECIFICATION FOR BAND 6 MODULATION TO READ "1/2% OF FULL SCALE" RATHER THAN "1/2% OF THE AVERAGE" OUTPUT SIGNAL (GSFC 400.8-D-210, PARAGRAPH 3.2.9.3). IT THEN BECOMES THEORETICALLY POSSIBLE TO MEET THE SPECIFICATION FROM SCENE TEMPERATURES 260°-320°K.

15. NEED FOR CHANGE THERE ARE TWO MAJOR PROBLEMS WITH ACØ5R AS CURRENTLY PLANNED AND SCHEDULED:

(1). A CONSERVATIVE ANALYSIS USING RECENT RESULTS OF UNIT LEVEL TESTS HAS SHOWN THAT THE SPECIFICATION, AS MODIFIED ABOVE, WILL BE MET. WITHOUT THE CHANGE, THE SPECIFICATION IS THEORETICALLY IMPOSSIBLE AT LOW SCENE TEMPERATURES.

(2). A MUCH MORE COMPLEX (AND EXPENSIVE) SYSTEM LEVEL TEST WOULD BE REQUIRED TO PROVIDE MORE INFORMATION THAN IS OBTAINED BY THE UNIT TEST/ANALYSIS APPROACH.

16. EFFECT ON ASSOCIATED EQUIPMENT
NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.
N/A

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
N/A

19. RECOMMENDED RETROFIT EFFECTIVITY
N/A

20. ESTIMATED KIT DELIVERY SCHEDULE
N/A

21. ESTIMATED COSTS/SAVINGS
NONE

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE
L. E. BLANCHARD [illegible]

TITLE
ASSOCIATE PROGRAM MANAGER

23. APPROVAL/DISAPPROVAL
Contractually implemented by Mod. #41 to NAS5-24200

GOVERNMENT ACTIVITY
NASA/GSFC

SIGNATURE
[illegible]

DATE
10/31/79

DD FORM 1 DEC 68 1693 GA 4104.3A

Engineering Change Proposal SHEET 2		CO [illegible]	REV
		SHEET 2 OF	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		CMI (RPI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE		X			
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X			

HONES

INTERDEPARTMENTAL CORRESPONDENCE

CIP

TO. Tom VanHorne CC: (See attached)
ORG: 44-29-00

SUBJECT: Band 6 Modulation,
System Performance Analysis
and Error Budget

DATE: 21 June 1979
REF. HS236-1381
FROM: Neal Dougherty
ORG. 40-92

BLDG. 373 MAIL STA. A340
LOC. SC EXT. 81731

INTRODUCTION

The IDC presented here examines four contributors to band 6 modulation, predicts the system modulation which will be observed, and recommends that the planned system level test not be conducted. As an alternative, subsystem level tests combined with system modeling are recommended to verify compliance with the system band 6 modulation specification.

SUMMARY OF RESULTS AND CONCLUSIONS

The System Level Scan Modulation Specification

The specification for band 6 modulation should be changed to require that the peak-to-peak modulation be less than 1/2 percent of maximum signal level. The specification currently requires that the peak-to-peak modulation be less than 1/2 percent the average signal level. Meeting the current specification is theoretically impossible at scene radiation temperatures near the minimum (260°K). Also, at low scene temperatures, 1/2 percent of the signal is well below the quantizing noise.

The optical contributions to the system scan modulation are conservatively estimated to be less than 0.33 percent. These contributions result from motion of the scan mirror and the scan line corrector.

If the electronic subsystem specifications are met, the net electronic contribution to band 6 modulation will not excede 0.16 percent and the total band 6 modulation would be less than 0.49 percent.

Currently planned subsystem tests, combined with modeling and analysis, are sufficient to establish compliance with the band 6 modulation specification.

Need for System Level Tests

The currently planned system level band 6 modulation tests will not be capable of isolating and characterizing the subsystem contributions to system band 6 modulation. Much more extensive system testing is required to do this.

It is not anticipated that corrective ground based processing will be required to comply with the band 6 modulation specification. However, if it were required, the model used for ground correction would necessarily be based upon the results of subsystem level tests and modeling, not on system level tests.

Necessary Conditions for Systems Level Testing

If the system level test is performed, the "uniform temperature plate" must be sufficiently rough and diffuse that no specular reflections are possible and the emissivity is independent of direction. Ideally, the plate surface would be a nondirectional blackbody.

A system level test cannot determine compliance with either the existing specification or the proposed modified specification unless preceded by band 6 radiometric calibration. Neither full scale nor average signal level are accurately defined before calibration.

SUBSYSTEM CONTRIBUTIONS TO BAND 6 MODULATION

There are four subsystem contributors to band 6 modulation: 1) scan mirror reflectivity (variation with scan angle), 2) scan line corrector, 3) detector/preamplifier ac coupling, and 4) video dc restore. The contribution of each subsystem is discussed and the total contribution conservatively estimated in this section.

The contribution of each subsystem is expressed as a fraction of full scale rather than as a fraction of the average signal. The rationale for this choice is presented in the next section which discusses a problem with the system level specification.

Scan Mirror Reflectivity Contribution

To analyze the impact of scan mirror variations on band 6 modulation, consider the simplified model of Figure 1. The radiation from the mirror which results in irradiance, H, at the image plane consists of reflected radiation (image forming) and emitted radiation (nonimage forming or background). The irradiance of the image plane can then be expressed as

$$H = K \left\{ \rho(\theta)\, N(T_s) + \epsilon(\theta)\, N(T_m) \right\} + H_B \qquad (1)$$

where:

$N(T)$ = "in band" radiance of a blackbody at temperature, T

T_s = radiation temperature of the scene

T_m = surface temperature of the mirror

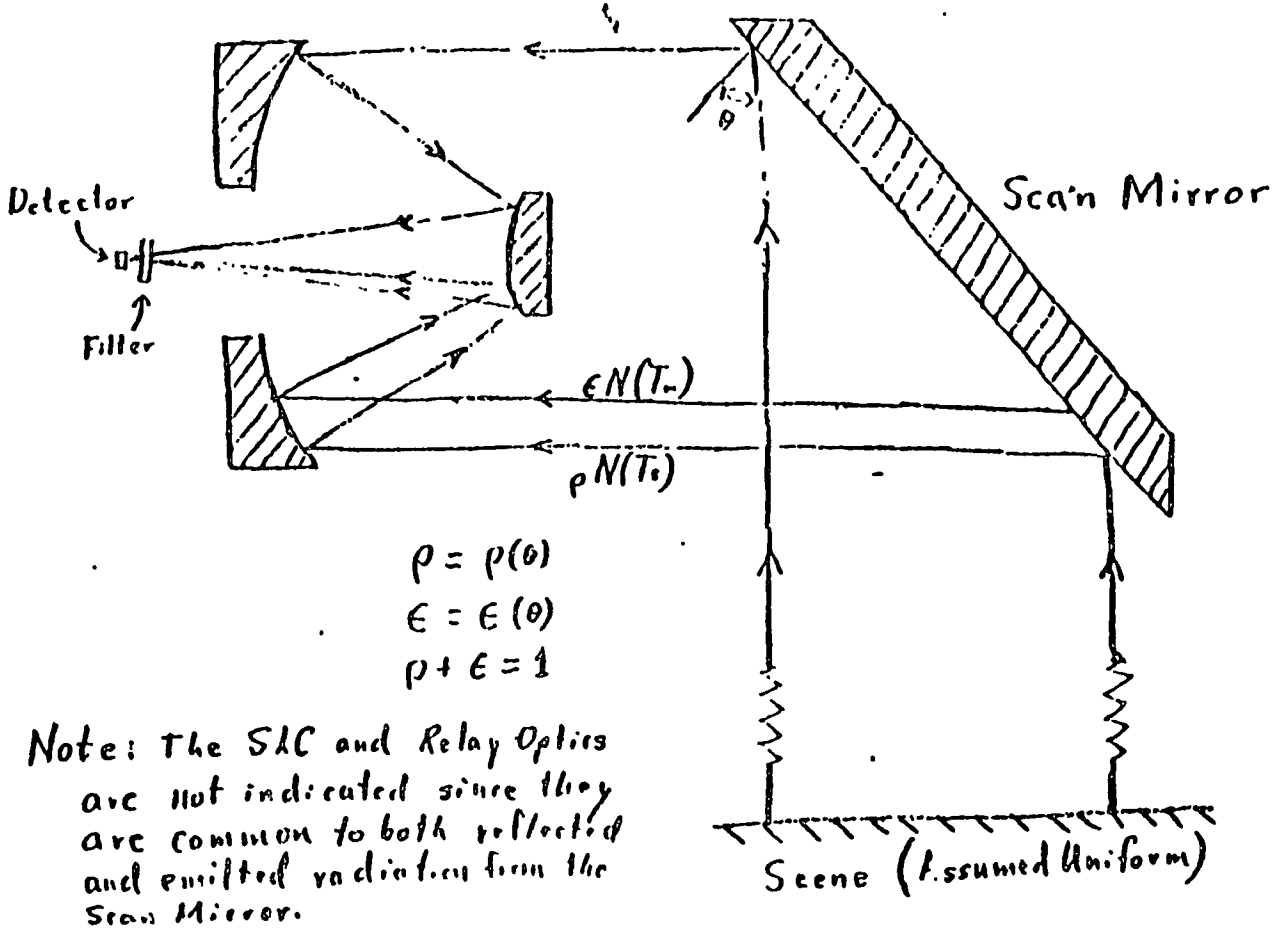

FIGURE 1. SCAN MIRROR MODULATION MODEL

$\epsilon(\theta)$ = mirror emissivity at angle

$\rho(\theta)$ = mirror reflectivity at angle

θ = angle of incidence of the mirror

K = a constant which incorporates the lens and mirror efficiencies

H_B = background irradiance

From Kirchoff's radiation law as applied to an opaque reflecting surface,

$$\rho(\theta) + \epsilon(\theta) = 1. \tag{2}$$

Substituting for ϵ in Equation 1 and collecting the terms:

$$H = K\left\{N(T_m) - \rho\left[N(T_s) - N(T_m)\right]\right\} + H_B \tag{3}$$

The incremental change, ΔH_ρ, for a small change, $\Delta\rho$, can then be computed as

$$\Delta H_\rho = \frac{\partial H}{\partial \rho}\Delta\rho = K\left[N(T_s) - N(T_m)\right]\Delta\rho \tag{4}$$

For a full scale signal, the incremental change in focal plane irradiance, ΔH_{FS}, is

$$\Delta H_{FS} = H(T_s^{Max}) - H(T_s^{Min}) \tag{5}$$

and substituting Equation 3 into Equation 5

$$\Delta H_{FS} = K\left[N(T_s^{Max}) - N(T_s^{Min})\right]\rho \tag{6}$$

The fractional contribution to band 6 modulation, $F\rho(Ts)$, is the ratio $\Delta H\rho/\Delta H_{FS}$. Dividing Equation 5 by Equation 6 obtains:

$$F_\rho(T_s) = \frac{\Delta H_o}{\Delta H_{FS}} = \frac{[N(T_s) - N(T_m)]\Delta\rho}{[N(T_s^{Max}) - N(T_s^{Min})]\rho} \quad (7)$$

Since N(T) is a monotonically increasing function of T, the extreme value of $F\rho(Ts)$ can be determined by computing the value at $T_s = T_s^{Max}$ and T_s^{Min} and selecting the largest absolute value of the two.

For the Thematic Mapper, the following values apply:

Parameter	Value	Source
ρ	.953	(See Appendix A)
$\Delta\rho$	.0055	(See Appendix A)
T_s^{Max}	320°K	
T_s^{Min}	260°K	
T_m	294°K	

which, substituted into Equation 7 and referring to blackbody tables produce:

$$F_\rho(320^\circ K) = 2.4 \times 10^{-3}$$

and

$$F_\rho(260^\circ K) = -3.1 \times 10^{-3}$$

The largest contribution to band 6 from the scan mirror is then 0.31 percent.

It is worth noting that scene radiation temperatures below 260°K and above 320°K would be clipped since they lie outside the band 6 dynamic range. The usefulness of the imagery would be seriously limited as the average scene radiation temperature approaches these dynamic range limits. Thus the 0.31 percent scan modulation contribution represents a conservative upper limit.

Scan Line Corrector Contribution

The contribution of the scan line corrector to band 6 modulation results from the translation of the image of the telescope (as viewed from

the detector plane) over a .066 inch range. Since the mapper has been carefully designed to avoid vignetting, any modulation will be due to the slight changes of perspective which cause each detector to view an incrementally different solid angle of internal structural and baffling members. If only one of these members (the odd member) differs by ΔT from the cavity temperature, the fractional contribution, F_{SLC}, can be estimated as:

$$F_{SLC} = R_\Omega \frac{\epsilon}{\tau} \frac{\Delta T}{(60^\circ K)}, \tag{8}$$

where:

R_Ω = ratio of the incremental change in solid angle of the odd member to the solid angle of the telescope exit pupil

ϵ = emissivity of the odd temperature member

τ = telescope effective transmission, including the obscuration ratio

ΔT = temperature difference of the odd member (°K)

$60^\circ K$ = TM band 6 dynamic range

For the Thematic Mapper, the following values are representative

$R_\Omega = 1.33 \times 10^{-3}$

$\epsilon = 0.8$

$\tau = 0.7$

which, substituted into Equation 8, yield

$$F_{SLC} = 2.5 \times 10^{-5} \Delta T \tag{9}$$

If the odd member is assumed to be at a temperature difference 8°K from the cavity (an extreme value considering existing thermal predictions), F_{SLC} becomes 2.0×10^{-4}.

AC Coupling Contribution

The signal from the detector preamplifier combination is ac coupled to the remainder of the video chain. This results in low frequency response that will result in some droop in the signal during a line scan. The subsystem specification limits this droop to not more than 0.1 percent of full scale signal.

DC Restore Contribution

The dc restore for band 6 is located in the multiplexer. The dc restore drift is restricted to 2.5 mV out of a full scale 4.0 volts. This translates into a fractional contribution of .06 percent.

Total Band 6 Modulation*

If the subsystem specifications for ac coupling and dc restore are met, the upper limit of band 6 modulation is presented in the following tabulation. All modulation contributions are expressed as a percentage of full scale signal.

Subsystem	Modulation Contribution, %	References
Scan mirror	0.31	Derived function of P(θ), Tm, Ts
SLC	0.02	Derived worst case, HS 236-5687
AC coupling	0.10	DS 32015-003B
DC restore	0.06	DS 32015-005
Total	0.49	

A PROBLEM WITH THE SYSTEM SPECIFICATION

The system specification (GSFC S-726-9, paragraph 3.2.9.3) for scan modulation requires that the scan modulation be less than 1/2 percent of the average signal level of the scan. This presents two problems:

1) When the average signal level is relatively low within the dynamic range, 1/2 percent of the average level is far below the combined analog and quantizing noise of the system.

*See Appendix B for a reconciliation between the table and the performance budget presented at the Detailed Design Review.

2) Certain contributors to scan modulation, while very small, do not approach zero as the signal level shrinks. As the average signal level approaches zero, these contributors alone will prevent the specification from being met. An example is analyzed and discussed below.

Scan Mirror

For illustration purposes, the scan mirror reflectivity will be allocated all of the scan modulation budget of 1/2 percent of the average signal level. From Equation 4 above, the scan modulation is then

$$\Delta H_\rho = K\left[N(T_s) - N(T_m)\right]\Delta\rho \qquad (10)$$

The average signal level can be computed as

$$\Delta H_{AVE} = \frac{1}{\theta_2 - \theta_1}\int_{\theta_1}^{\theta_2}\left[H(T_s) - H(T_s^{Min})\right]d\theta \qquad (11)$$

and substituting from Equation 3,

$$\Delta H_{AVE} = \frac{K}{\theta_2 - \theta_1}\left[N(T_s) - N(T_s^{Min})\right]\int_{\theta_2}^{\theta_1}\rho(\theta)\,d\theta$$

which may be expressed as

$$\Delta H_{AVE} = K\left[N(T_s) - N(T_s^{Min},\right]\rho_{AVE} \qquad (12)$$

where

$$\rho_{AVE} = \frac{1}{\theta_2 - \theta_1}\int_{\theta_1}^{\theta_2}\rho(\theta)\,d\theta$$

The specification requires the following relationship be satisfied:

$$\left| \frac{\Delta H_\rho}{\Delta H_{AVE}} \right| \leq 0.005 \qquad (13)$$

and substituting from Equations 10 and 12

$$\left| \frac{\left[N(Ts) - N(Tm) \right] \Delta \rho}{\left[N(Ts) - N(T_s^{Min}) \right] \rho_{AVE}} \right| \leq 0.005 \qquad (14)$$

and dividing by $\left| \frac{\Delta \rho}{\rho_{AVE}} \right|$:

$$\left| \frac{N(Ts) - N(Tm)}{N(Ts) - N(T_s^{Min})} \right| \leq \frac{0.005}{\left| \frac{\Delta \rho}{AVE} \right|} \qquad (15)$$

For the Thematic Mapper, the following values apply

$$\left| \frac{\Delta \rho}{\rho_{AVE}} \right| = 0.003$$

$$T_s^{Min} = 260^\circ K$$

$$Tm = 294^\circ K$$

which, substituted into Equation 15, yield

$$\left| \frac{N(Ts) - N(294^\circ K)}{N(Ts) - N(260^\circ K)} \right| \leq 1.67 \qquad (16)$$

Remembering that N(T) is amonotonically increasing function of T, it is clear that as Ts approaches 260°K, the magnitude of the numerator remains finite while the denominator approaches zero. Clearly, Equation 16 cannot be satisfied as Ts approaches 260°K.

Equation 16 demonstrates that the system specification cannot be met throughout the scene temperature dynamic range even if all of the error budget were allocated to the scan mirror. This is true while the worst case contribution of the scan mirror reflectivity is only .62 times one quantizing level.

COMMENTS

Comments on the system level test are as follows:

1) If band 6 scan modulation is to be measured on a systems level, the test must be performed with actual subsystems. Since the multiplexer will not be available at the time the test is scheduled, the test should be postponed.

2) The worst case contribution of the scan mirror reflectivity occurs at 260°K (8°F). If the worst cases are to be included in the test, the plate should be cooled to this temperature. Of course, when the test plate is well below the room (or cavity temperature), its reflectivity must be very low to avoid invalidating the test. Condensation may also be a problem.

3) If the test were conducted with the test plate at the same temperature as the scan mirror, Equation 4 shows that the scan modulation contribution of the mirror reflectivity would be zero, independent of the variation in reflectivity over the scan.

4) If the test plate is only going to be operated above the mirror temperature, the surface should be rough (diffuse) and its emissivity known. The emissivity need not approach 1.

5) The key element in conducting a valid experimental assessment of the contribution of scan line corrector is that the internal structural members of the telescope assume the actual dynamic temperatures which would occur during an orbital cycle. A method is required to force these temperatures to comply with predicted values or, alternatively, to simulate the orbital environment.

6) The system level test requires the output of band 6 calibration to determine compliance with the system specification.

RECOMMENDATIONS

The following recommendations are made:

1) Replace system level test with subsystem (or unit) tests and the above analysis.

2) Review the subsystem tests planned to establish compliance for the dc restore and the ac coupling. Make certain the tests are conducted in a manner which will permit these subsystems to be characterized as well as measured.

3) Negotiate a change in the scan modulation specification to allow 1/2 percent of full scale signal rather than 1/2 percent of the average signal.

APPENDIX A. Band 6 Reflectivity Over the Angular Range

During the time which imagery is being collected, the angle of incidence at the scan mirror ranges linearly from 31° to 39°. The band 6 bandpass is from 10.5 μm to 12.5 μm.

From the average reflectivity values computed by Tim Wise and Sam Pellicori, the following table was constructed:

λ (μm)	ρ(31°)	ρ(39°)	Δ ρ
10 5	0.9581	0.9484	0.0087
11.5	0.9753	0.9692	0.0061
12.5	0.9832	0.9814	0.0018
Averages	0.9667		0.0055

APPENDIX B. Reconciliation

The scan modulation performance budget developed in this IDC is significantly different than that presented at the Detailed Design Review (HS 236-0677, Table 2.1-16, p. 2-41). The new performance budget reflects a refinement of the underlying analysis as well as the current status of subsystem development and testing.

Scan Mirror Reflectivity and Polarization

The scan mirror reflectivity and polarization changed from 0.30 percent to 0.31 percent. While the numerical change is small, the analytical bases for the values are quite different. The anticipated $\Delta\rho$ over and δ is now 0.55 percent rather than 0.2 to 0.3 percent. However, when the mirror self-emission is accounted for, the contribution to band 6 modulation is 0.31 percent under worst case conditions.

Scan Line Corrector

It was previously assumed that the scan line corrector contribution to band 6 modulation resulted from the angle of incidence, the position of the beam on the corrector mirrors, and the presence of strong lateral thermal gradients on these mirrors. However, this is no longer the case. The scan line corrector contribution is now understood to result from small perspective changes of internal members of the telescope as viewed by the detectors.

Signal Droop

Signal droop is treated as two separate contributors, dc restore and ac coupling. We now anticipate that the subsystem specification for the multiplexer dc restore circuit will be readily met, producing a contribution not to exceed 0.06 percent.

The ac coupling contribution to band 6 modulation as defined in the top line specification is actually negligible. This is because band 6 modulation is defined as the response to a uniform scene. Ac coupling only contributes to band 6 modulation when the scene average temperature is changing, not when it is uniform. In the new performance budget, a conservative upper limit of 0.1 percent (the subsystem specification) has been assumed.

In flight operation, the ac coupling will contribute to band 6 Modulation since the average scene temperature changes along track. The along-track radiation temperature gradients for which 0.1 percent modulation will not be exceeded are discussed later in this appendix.

Stray Radiance

When current measurements of the scattering properties of the scan mirror surface in the band 6 region are considered, the stray radiance in this band is found to vary less than 0.01 percent as the mirror scans. For this reason, this contribution is not included in the performance budget of this IDC.

Component Temperature Variations

Component temperature variations are considered in the scan line corrector contribution since this is the way they can significantly contribute during a 60 ms active scan. They are not separately considered.

Finally, note that this IDC algebraically sums the contributions to band 6 modulation to estimate total modulation. This is more conservative than root sum squaring them as was done in HS 236-0677, Table 2.1-16.

Ac Coupling, In-Flight Contribution

In-flight, significant along-track (i.e., north-south) average radiation temperature gradients will occur. These gradients will, in turn, cause the ac coupling contribution to band 6 modulation to be nonzero. Using the measured time constant (14 seconds), it is possible to examine the along-track gradient conditions under which the contribution will be less than 0.1 percent full scale.

To bound these conditions, it was assumed that at the average temperature along-track was constant until some point at which a gradient began. For a maximum 0.1 percent scan modulation, the relationship between the gradient and the distance over which the gradient extends is derived. The result is presented in Figure 2.

Below the curve in which the modulation equals 0.1 percent, the scan modulation will be less than 0.1 percent. At the line, the 0.1 percent subsystem specification will be equaled. Above the line, the specification will be exceeded.

Several features of the curve are of interest. Note that on the left hand side the curve begins to approach the line where the product of the gradient times the distance is 14°K. 14°K is the maximum increment for a step function without exceeding 0.1 percent modulation.

On the other hand, for gradients less than .0167°K/km, the 0.1 percent scan modulation limit will not be exceeded no matter how long the distance over which they extend. In this context, a relatively extreme average winter gradient from Texas to the Canadian Border would be about .025° K/km. Local gradients which are much higher, but extend for shorter

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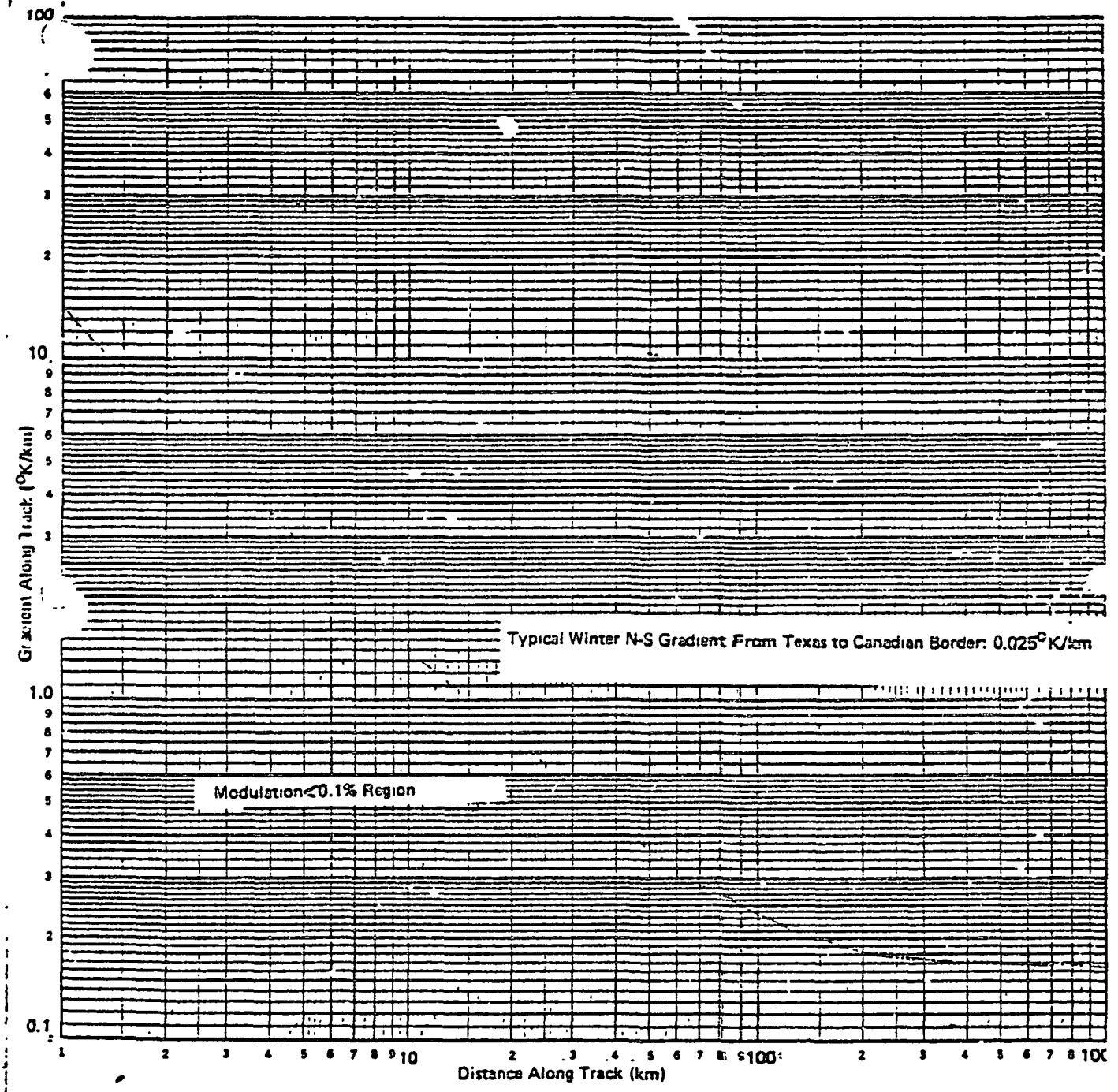

FIGURE 2. A/C COUPLING SCAN MODULATION (≤0.1% REGION)

distances, would be common in the continental United States. The highest gradients would occur at land water interfaces.

ENGINEERING CHANGE PROPOSAL (SHORT FORM) (SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
8/16/79	8	

4. ORIGINATOR NAME AND ADDRESS	5. ORG. CODE	6. CLASS OF ECP	7. ACT. CODE	8. PRIORITY
Hughes Aircraft Company Culver City, California 90230	82577	I		

9. SPECIFICATIONS AFFECTED / 10. DRAWINGS AFFECTED

NOMEN. CODE	SPECIFICATION/DOCUMENT NO.	NOMEN. CODE	NUMBER	REV.
	GSFC 400.8-D-210, Revision B			
	DS32015-003B			

11. TITLE OF CHANGE
CHANGES IN THEMATIC MAPPER SYSTEM SPECIFICATION (GSFC 400.8-D-210, REVISION B, APRIL 1978), SEC. 3.2.8.1

12. CONTRACT NO. & LINE ITEM
NAS 5-24200

13. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER SYSTEM

14. IN PRODUCTION
☐ YES ☒ NO

15. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
THEMATIC MAPPER

16. PART NO. OR TYPE DESIGNATION

17. DESCRIPTION OF CHANGE
INCORPORATE THE CHANGES OUTLINED IN THE MARCH 26, 1979 MEMO FROM V. V. SALOMONSON TO O. WEINSTEIN (MODIFIED TO REFLECT THE VERBAL DIRECTION PROVIDED TO N. R. DOUGHERTY BY V. SALMONSON, 7/17/79). THE CHANGES ADDRESS:
(1). THE RADIOMETRIC CALIBRATION CRITERIA
(2). THE SPECTRAL MATCHING CRITERIA

18. REASON FOR CHANGE
CUSTOMER REQUEST

19. EFFECT ON ASSOCIATED EQUIPMENT
NONE

20. PRODUCTION EFFECTIVITY BY SERIAL NO.	21. EFFECT ON PRODUCTION DELIVERY SCHEDULE
NA	NONE
22. RECOMMENDED RETROFIT EFFECTIVITY	**23. ESTIMATED KIT DELIVERY SCHEDULE**
NA	NA

24. ESTIMATED COSTS/SAVINGS
NONE

ORIGINATING ACTIVITY SIGNATURE	TITLE
N. DOUGHERTY	

CONCURRENCE/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE
T. B. VAN HORNE		8/24/79

DD FORM 1693 GA 4104JA

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Engineering Change Proposal SHEET 2		LCP NUMBER	REV
		SHEET 2 OF	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RPT)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE		X			
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X			

TABLE III

Band No.	Spectral Radiance at Lower Band Edge (mw/cm²-sr-μm) WAS	IS	Spectral Radiance at Upper Band Edge (mw/cm²-sr-μm) WAS	IS	In Band Flat Radiance (mw/cm²-s. WAS	IS	Minimum Saturation Levels From 3.2.9.4 (mw/cm²-sr) WAS	IS
1	7.9	5.7	10.0	10.0	0.70	0.45	1.00	1.00
2	7.1	9.9	5.0	9.1	0.57	0.77	2.33	2.33
3	3.3	3.2	7.7	7.8	0.46	0.25	1.35	1.35
4	10.7	13.2	21.4	14.1	3.00	1.93	3.00	3.00
5	2.3	2.3	2.9	1.7	0.58	0.40	0.6	0.6
7	1.2	0.47	1.6	.41	.43	0.12	.43	.43

The specified performance shall be achieved after application of a calibration that is the same for both test conditions. Verification that the instrument meets the requirements of this paragraph may be achieved through a combination of component testing (e.g. filter and detector response) and analysis.

3.2.9 Radiometric Requirements

3.2.9.1 Radiometric Sensitivity

The TM output in each of the bands 1 through 5 and 7 shall have a signal-to-noise ratio (SNR) for specified input in accordance with Table IV. For a constant input radiance, the SNR is defined as the ratio of the output value (in units of radiance) averaged over at least one hundred samples to the root mean squared (RMS) value of the noise equivalent radiance which is defined as the RMS of the deviations of the output samples from the average value. All SNR measurements shall be taken with the processing electronics in a linear gain mode except for those bands where quantizing noise precludes meeting the SNR requirements.

TABLE IV

Band No.	Constant In Band Input Radiance (mw/cm²-sr)	Minimum SNR
1	0.28	32
2	0.24	35
3	0.13	26
4	0.19	32
5	0.08	13
7	0.046	5

poses when the Thematic Mapper is mounted on a spacecraft. The optical surfaces shall be polished optical flats of 1/4 wavelength quality with reflectivity greater than 70 percent. All mirror surfaces on the cube shall be orthogonal to within ± 5.0 arcsec. Normals to these surfaces shall be used to define theThematic Mapper axes within 3 arcmin. One of these normals shall be set up parallel to the Thematic Mapper optical axis within 3 arcmin (873 μrad) and shall be known (measurable) to less than 300 μrad in each axis. The Thematic Mapper optical axis is defined at the midscan view of the nadir.

TABLE III. SPECTRAL MATCHING

Band No.	Condition I				Condition II	
	Spectral Radiance at Lower Band Edge, mW/cm^2-sr-μm		Spectral Radiance at Upper Band Edge, mW/cm^2-sr-μm		Band Flat Spectral Radiance, mW/cm^2-sr-μm	
	WAS	IS	WAS	IS	WAS	IS
1	7.9	5.7	10.0	10.0	10.0	6.43
2	7.1	9.9	5.0	9.1	7.1	9.63
3	3.3	3.2	7.7	7.8	7.7	4.17
4	10.7	13.2	21.4	14.1	21.4	13.79
5	2.3	2.3	2.9	1.7	2.9	2.00
7	1.2	0.47	1.6	.41	1.6	.44

For purposes of implementation, the center scan mirror locked position and end of scan hold positions may be used.

3.3 Subsystem Requirements

3.3.1 Telescope Assembly

3.3.1.1 Optical Metering Structure. The requirements for the optical metering structure are given in the specification 16085 and drawing 50841.

3.3.1.2 Primary Optics. The radiometer shall be designed with a two-element reflective optical system (Ritchey-Cretien) with the following basic characteristics:

Effective Focal Length	96.0 ± 0.15 inches
Diameter Primary Mirror	16.0 inches nominal
Diameter Secondary Mirror	5.3 inches nominal
Reflectivity, each mirror	94 percent minimum
Focal length/aperture	6
Useful collecting area	163.0 in^2

Unvignetted field covers the detector array that is shown in figure 4.

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HS 236-0019-0587

ENGINEERING CHANGE REQUEST

HUGHES
CODE IDENT 52577

ECR NO. — 831325
SHEET 1 OF SHEETS

REQUEST

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(S)
TM MATIC MAPPER	SYSTEM		TP32015-500

DESCRIPTION OF PROBLEM

THE PRESENT RADIOMETRIC CALIBRATION AND CHANNEL GAI ADJUSTMENT REQUIRES EQUAL RESPONSE FROM ALL CHANNELS FOR THE SPECTRUM FROM THE 48" INTEGRATING SPHERE. TYPICAL EARTH SCENE SPECTRA WILL DIFFER CONSIDERABLY AND COULD RESULT IN STRIPING DUE TO SPECTRAL MISMATCHING OF THE CHANNELS

PROPOSED SOLUTION

- MAKE CHANNEL GAIN ADJUSTMENTS BASED ON THE SPECTRA SPECIFIED IN GSFC 400.8-D-210 AS MODIFIED BY THE REVISIONS RECOMMENDED BY U. SALOMONSON

REQUESTED BY	EXT	BLDG./M/S	ORG CODE	DATE	URGENCY
T R IAN HORNE	88149	373/603	440-29	4/12/84	. S/W MODIFICATIONS MAY BE REQUIRED
APPROVED					RECM EFF / RECM DISP OF ITEMS
APPROVED					

DISPOSITION

☒ ACCEPTED
☐ REJECTED

REASON FOR REJECTION: Prepare ECP

DATE RECD IN ECC: 4/13/84
SCH REPLY DATE:
ADV:

CHANGE CLASS	SPECIFICATION OR CONTROL ITEM	RESP SPEC ACT. OR RESP ENGRG ACT.	ECA NUMBER
☒ I ☐ IIA ☐ IIB	ECP	N. Bouchet, 0 1	ECA 467
DOCUMENT NO.(S) FOR IIB CHANGE			

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	D
			RESP SPEC ACT.			PROGRAM MGMT		

CLASS IIB RELEASE AUTHORIZATION

CHANGE EFFECTIVITY	CONTRACT NO.	MANUFACTURING	D
DISPOSITION OF ITEMS	CUSTOMER DATE	ENGRG CHANGE CTR	C

1252 CS OCT 72

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES
CODE IDENT 81377

ECA NO. 467153 | REV
☒ COMPLETE ☐ ADVANCE | SH 1 OF

ITEM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECR NO.
HS236	THEMATIC MAPPER		031325

CONTRACT NO.

ECM CLASS	URGENCY	RELATED ECA NO. (S)
	ROUTINE	

BASE LINE AFFECTED

PRODUCT BASE LINE AFFECTED AND CHANGE IS:
☐ PRODUCTION ONLY ☐ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	LE
GSFC 400.8-D-210, Rev. "B"							
D532015-003B		SCN					

TITLE OF CHANGE
CHANGES IN THEMATIC MAPPER SYSTEM SPECIFICATION (GSFC 400.8-D-210. REVISION "B", APRIL 1978) SECTION 3.2.8.1

RELATED FACTORS ON SH 2 ARE AFFECTED ☐ Y ☐ N

DESCRIPTION OF CHANGE
INCORPORATE CHANGES OUTLINED IN THE MARCH 26, 1979 MEMO FROM V. V. SALOMONSON TO O. WEINSTEIN MODIFIED TO REFLECT VERBAL DIRECTION PROVIDED TO N. R. DOUGHERTY BY V. V. SALOMONSON, 7/17/9
(1). RADIOMETRIC CALIBRATION CRITERIA
(2). SPECTRAL MATCHING CRITERIA

JUSTIFICATION FOR CHANGE
CUSTOMER REQUEST

ORIGINAL PAGE IS OF POOR QUALITY

EXTENT OF TESTING
NO CHANGE

RECM CHANGE EFFECTIVITY

RECM DISPOSITION OF ITEMS

APPROVAL FOR EVALUATION

	ORG CODE	DATE		ORG CODE	DATE	REQUIRED:
William D. Herd	41-20-01	7/31/79	Neal R. Dougherty / NEAL R. DOUGHERTY	40-91	7/10/9	
			DEPARTMENT MGR			ECAE ☐ YES ☐
			CONFIG MGMT OFFICE			MAEC ☐ YES ☐
			PROGRAM MANAGER			SAEC ☐ YES ☐

CHANGE APPROVAL

	ORG CODE	DATE		ORG CODE	DA
☐ APPROVED					
☐ REJECTED			CHANGE EFFECTIVITY BOARD CHM:	44-29	V3

AUTHORIZATION FOR RELEASE

PROPOSAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE LTR	DATE

ENGINEERING CHANGE PROPOSAL (SHORT FORM)
(SEE 216-575-421 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
1/17/80	9 REV. A	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
Hughes Aircraft Company Culver City, California 90230	82577	1		

MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	7. DRAWINGS AFFECTED NUMBER	REV.
			3533000-400	B

8. TITLE OF CHANGE	9. CONTRACT NO. & LINE ITEM
TILT MUX CONNECTORS FOR CABLE ACCESS	NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE	11. IN PRODUCTION
PROTOFLIGHT AND FLIGHT MODELS	[✓ YES] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	13. PART NO. OR TYPE DESIGNATION
RF CONNECTOR HOUSING COVER	3569208

14. DESCRIPTION OF CHANGE

MODIFY MULTIPLEXER ELECTRICAL INTERFACE CONNECTOR ORIENTATION 50°, ANGLED TOWARD THE MUX MOUNTING SURFACE, AND RELOCATE THEM TO BE IN LINE PARALLEL TO THE X-AXIS. THIS CHANGE AFFECTS J1 THROUGH J8.

NOTE: CONTRACT MODIFICATION NO. 25 DIRECTS IMPLEMENTATION OF THIS CHANGE.

15. NEED FOR CHANGE

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CUSTOMER DIRECTION:

THE PRESENT LOCATION OF THE MULTIPLEXER ELECTRICAL INTERFACE CONNECTORS IS IN THE IMMEDIATE VICINITY OF A LANDSAT-D STRUCTURAL MEMBER. AS A RESULT, THE ACCESS TO THESE CONNECTORS FOR MATING AND DEMATING IS VERY LIMITED.

16. EFFECT ON ASSOCIATED EQUIPMENT

NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
PROTOFLIGHT AND FLIGHT	NONE FOR INCORPORATION OF THIS CHANGE TO 3533000-400B

19. RECOMMENDED RETROFIT EFFECTIVITY	20. ESTIMATED KIT DELIVERY SCHEDULE
NONE	N/A

21. ESTIMATED COSTS/SAVINGS

REFER TO HUGHES TWX. HS236-0019-0475, MOD. NO. 25 DATED 12/18/78

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
[illegible]	Thematic Mapper FrogramManager

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1693 GA 4104.3A

0-15300

Engineering Change Proposal SHEET 2		ECP NUMBER NO. 9	REV A
		SHEET 2 OF 2	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-400	B	ECA467096-1A					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES	X		OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY	X		SUPPORT EQUIPMENT		X			

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES

ECA NO. 467006-1 | REV A | [X] COMPLETE [ ] ADVANCE | SH 1 OF 6

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECA NO.
LS236 THEMATIC MAPPER	THEMATIC MAPPER	THEMATIC MAPPER INTERFACE CONTROL DRAWING 3533000-400, Rev. B	740687
			CONTRACT NO. NAS 5-24200

ECM CLASS	URGENCY	RELATED ECA NO. (S)
I	HIGH PRIORITY	

BASE LINE AFFECTED: PROTOFLIGHT & FLIGHT

PRODUCT BASE LINE AFFECTED AND CHANGE IS: [X] PRODUCTION ONLY [ ] PRODUCTION AND RETROFIT [ ] RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DELETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DELETED
3533000-400 Rev. B		INCORPORATE IN REV. C					

TITLE OF CHANGE: MUX CONNECTOR TILT

RELATED FACTORS ON SH 2 ARE AFFECTED [X] YES [ ] NO

DESCRIPTION OF CHANGE

TILT MUX CONNECTORS TO PROVIDE INTERFACE ACCESS FOR GE ELECTRICAL CABLING.

JUSTIFICATION FOR CHANGE

CUSTOMER REQUEST

EXTENT OF TESTING: NONE

RECM CHANGE EFFECTIVITY: PROTOFLIGHT & FLIGHT

RECM DISPOSITION OF ITEMS: SCRAP

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE
L L Smith	20-62	1/10/80			
T B M Laughlin	44-29	1/10/80	DEPARTMENT MGR		
			CONFIG MGMT OFFICE		
			PROGRAM MANAGER		

REQUIRED:
ECAE [ ] YES [X]
MAEC [ ] YES [X]
SAEC [ ] YES [X]

CHANGE APPROVAL

		ORG CODE	DATE		ORG CODE	DATE
[ ] APPROVED						
[ ] REJECTED				CHANGE REVIEW BOARD CHM T B M Laughlin	44-29	1/25

AUTHORIZATION FOR RELEASE

PROPOSAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACTUAL AUTH	[ ] ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE CTR	DATE

ENGINEERING CHANGE ANALYSIS SHEET 2	HUGHES CODE IDENT 81877	ECA NO. 467096-1	REV A
		SHEET 2 OF 6	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETI
3533000-400 REV. B		INCORPORATE IN					
		REV. C					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES, EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES
SPECIFICATION, CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES	
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION	
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM	
WEIGHT/MASS PROPERTIES	X		OTHER SYSTEMS		X		
INTERCHANGEABILITY	X		INTERFACE	X			
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X		
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X		

ECA 467096-1 A

THEMATIC MAPPER INTERFACE CONTROL DRAWING 3533000-400
REV B
SHEET 3

ZONE 39E

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WAS: 16.25 WAS: 24.14

ZONE 40G

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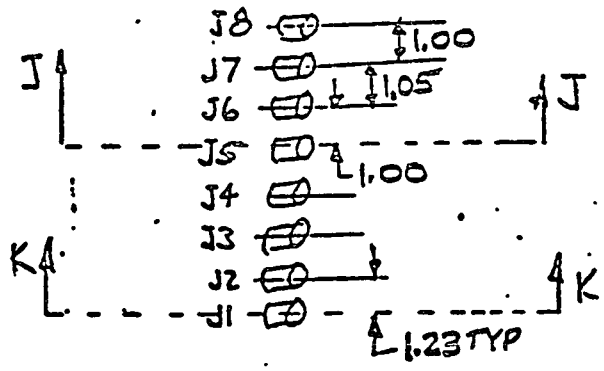

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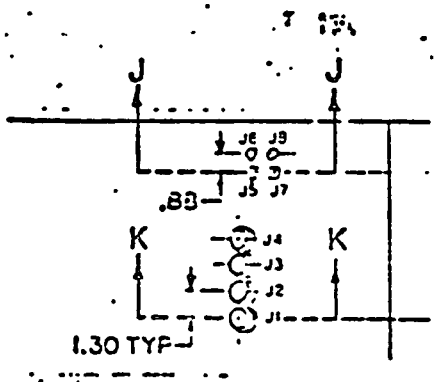

ECA 467096-1 A

THEMATIC MAPPER INTERFACE CONTROL DRAWING 3533000-400 REVB

SHEET 3

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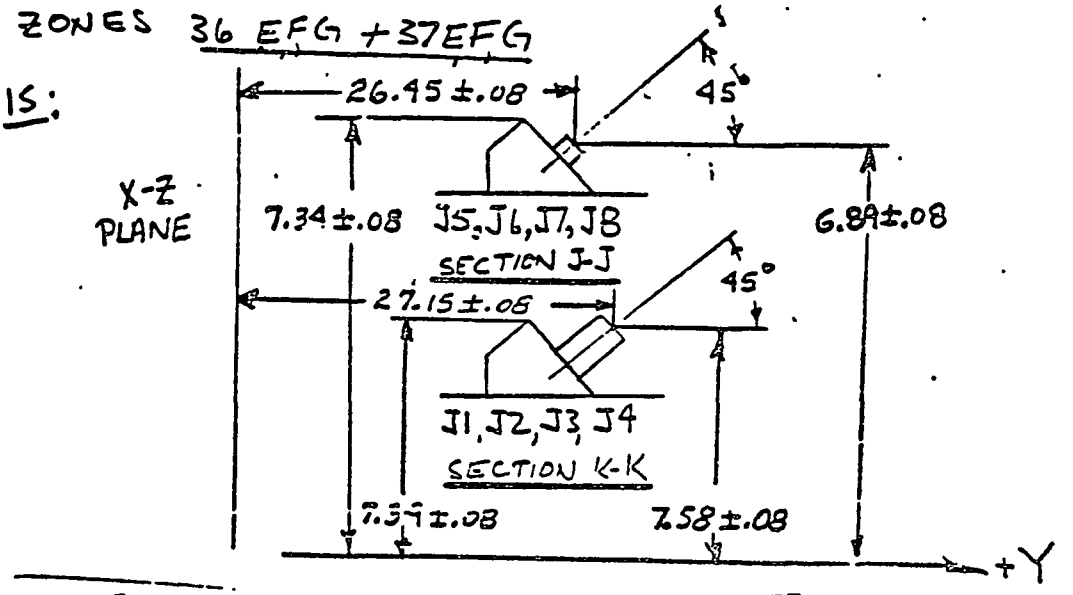

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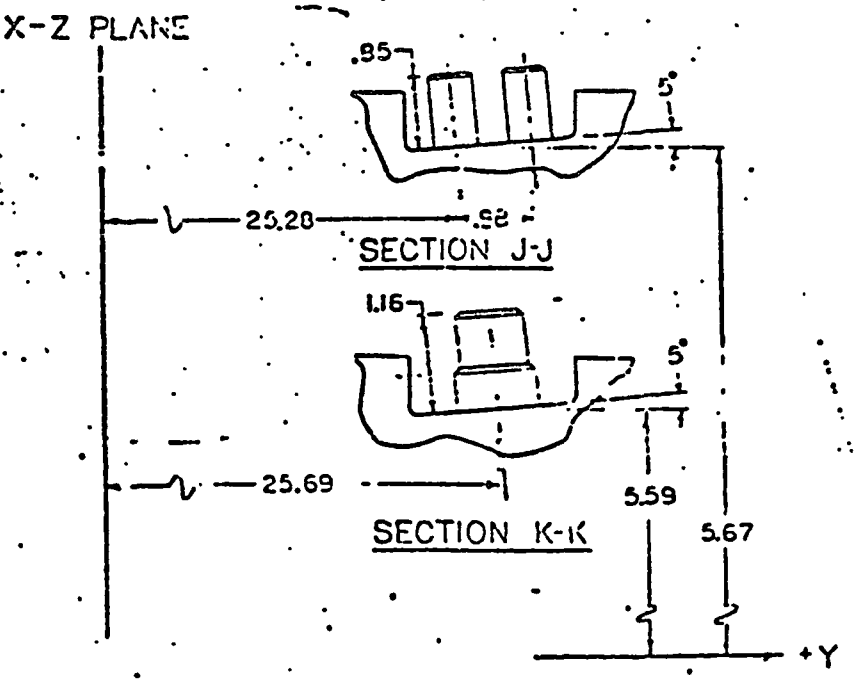

ECA 467096-1 A

THEMATIC MAPPER INTERFACE CONTROL DRAWING

35 33000 REV B SHEET 1

ZONE 12 F

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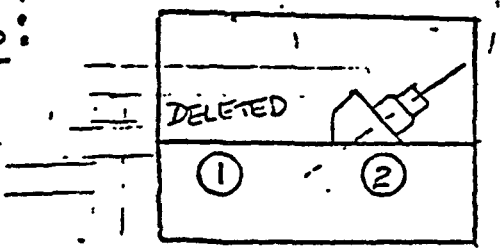

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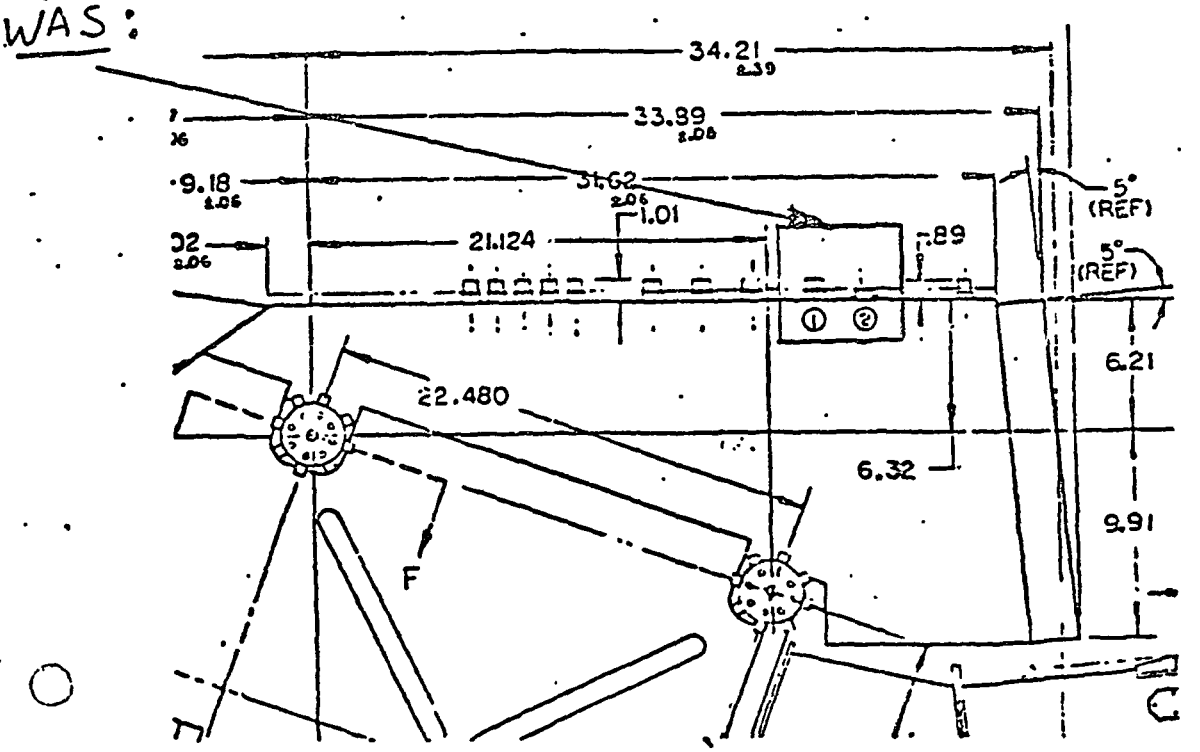
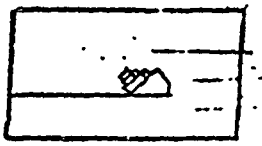
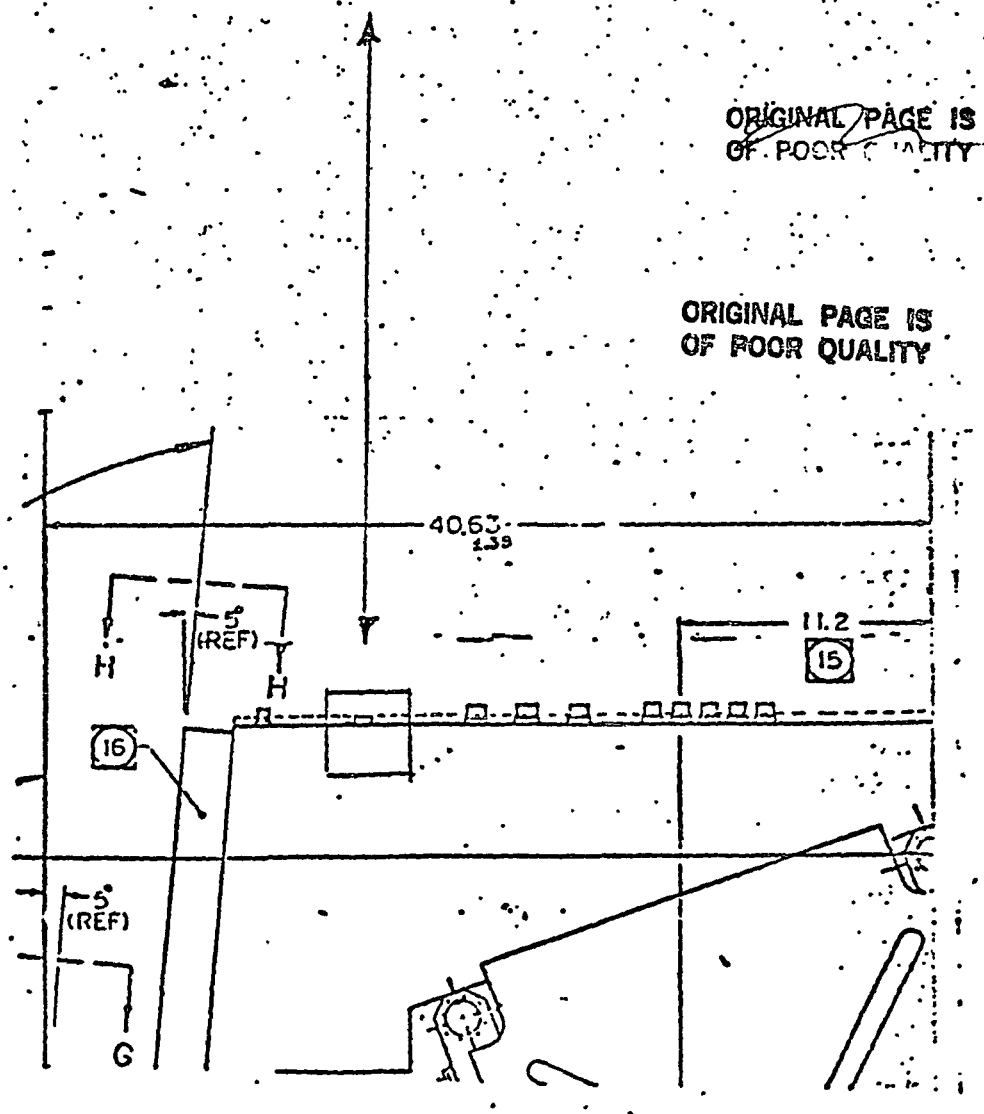


ECA 467096-1A

THEMATIC MAPPER INTERFACE CONTROL DRAWING
3533000 REV B SHEET 2

IS: ZONE 26F





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ENGINEERING CHANGE PROPOSAL (CONCEPT FORM)
(See MIL-STD-481 for instructions)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
8/23/79	10	

1. ORIGINATOR NAME AND ADDRESS	2. CONTR. ENG.	3. CLASS OF ECP	4. PRIORITY CODE
Hughes Aircraft Company Culver City, California 90230	82577	1	

5. SPECIFICATIONS AFFECTED		6. DRAWINGS AFFECTED	
GOVT. CODE	SPECIFICATION/DOCUMENT NO	GOVT. CODE	NUMBER / REV.
		HAC	3533000-400 / B

7. TITLE OF CHANGE
DELETE ELECTRICAL INTERFACE CONNECTORS J22 AND J23

8. CONTRACT NO. & LINE ITEM
NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE
THEMATIC MAPPER INTERFACE CONTROL DRAWING NO. 3533000-400B

11. IN PRODUCTION
[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
CABLE ROUTING ASSEMBLY

13. PART NO. OR TYPE DESIGNATION
52347

14. DESCRIPTION OF CHANGE

DELETE ELECTRICAL INTERFACE CONNECTORS J22 AND J23 SHOWN ON TM INTERFACE CONTROL DRAWING NO. 3533000-400B ENGINEERING CHANGE ANALYSIS NO. 467106 FOR INTERFACE CONTROL DRAWING NO. 3533000-400B, IS SUBMITTED HEREWITH.

NEED FOR CHANGE

ELECTRICAL CONNECTORS J22 AND J23 SHOWN ON THE INTERFACE CONTROL DRAWING 3533000-400B HAVE APPLICATION ONLY TO THE ENGINEERING MODEL. THE ICD HAS EFFECTIVITY FOR THE PROTOFLIGHT AND FLIGHT MODELS ONLY.

16. EFFECT ON ASSOCIATED EQUIPMENT
NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
PROTOFLIGHT AND FLIGHT MODELS	NONE
19. RECOMMENDED RETROFIT EFFECTIVITY	20. ESTIMATED AIT DELIVERY SCHEDULE
NONE	N/A

21. ESTIMATED COSTS/SAVINGS
NO COST

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
C. R. JONES	THEMATIC MAPPER PROGRAM MANAGER

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1693 GA 4104JA

Engineering Change Proposal SHEET 2		15 PAGES 16	REV
		SHEET 2 OF 2	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-400	B	ECA 467106					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP ETC		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X			

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES
COOPERMENT [illegible]

ECA NO. 46706 | REV
☒ COMPLETE ☐ ADVANCE | SH 1 OF

SKAIA	SYS/EQUIP NAME OR DES	CONTROL ITEM : AME & NO.	ECR NO.
2 236	Thematic Mapper	3533000-100	740692

CONTRACT NO.

% CLASS	URGENCY	RELATED ECA NO. (S)
1		

E LINE AFFECTED: 2 and Up

PRODUCT BASE LINE AFFECTED AND CHANGE IS:
☒ PRODUCTION ONLY ☐ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

CIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	D LE
5?3000-400		-					

LE OF CHANGE
Remove Electrical Connectors J22 and J23 from ICD

RELATED FACTORS ON SH 2 ARE AFFECTED ☒ Y ☐ N

CRIPTION OF CHANGE
Delete connectors J22 and J23 from the ICD.

ORIGINAL PAGE IS OF POOR QUALITY

TIF TION FOR CHANGE
Electrical connectors J22 and J23 shown on the ICD have application only to the engineering model. The ICD effectivit is for the pioflight and flight models only.

ENT OF TESTING
Testing will be unchanged.

RECM CHANGE EFFECTIVITY: 2 and Up

RECM DISPOSITION OF ITEMS: N/A

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE
[illegible]	40-92	13 Dec 78			
D. Heu	46-20	3/8/79	DEPARTMENT MGR		
Tom Komm	44-29	3/13/79	CONFIG MGMT OFFICE [illegible]	44-27	3/13/79
			PROGRAM MANAGER		

REQUIRED:
ECAE ☐ YES ☑
MAEC ☐ YES ☐
SAEC ☐ YES ☐

CHANGE APPROVAL

	ORG CODE	DATE		ORG CODE	DAT
☒ APPROVED					
☐ REJECTED					
			CHANGE REVIEW BOARD CHM		

AUTHORIZATION FOR RELEASE

OSAL NO.	CHG CLASS 1	CHANGE EFFECTIVITY	CUSTOMER	DATE
NTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	LING CHANGE CTR	DATE

IA CS OCT 75

ENGINEERING CHANGE REQUEST

HUGHES
CODE IDENT 02877

ECR NO. 740692
SHEET 1 OF 2 SHEETS

REQUEST

F M	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(S)
HS 236	Thematic Mapper.	3533000-100	3533000-400

DESCRIPTION OF PROBLEM

J22 and J23 presently specified on the Thematic Mapper Interface Control Drawing, 3533000-400, have application only to the TM Engineering Model. The ICD effectivity is for the Protoflight and Flight Models only.

PROPOSED SOLUTION

Delete electrical connectors J22 and J23 and associated dimensions from the ICD.

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OF POOR QUALITY

REQUESTED BY	EXT	BLDG, M/S	ORG CODE	DATE	URGENCY
F D McLaughlin	83479	373/2033	10-92	12 Dec 78	High Priority
APPROVED					
APPROVED					

RECM EFF	RECM DISP OF ITEMS
2 Up	N/A

DISPOSITION

☒ ACCEPTED
☐ REJECTED

REASON FOR REJECTION: Appd for ECP prep 1/23/79 JH

DATE RECD IN ECC	SCH REPLY DATE	ADVANC
1/12/79		☐

CHANGE CLASS	SPECIFICATION OR CONTROL ITEM	RESP SPEC ACT. OR RESP ENGRG ACT.	ECA NUMBER
☒ I ☐ IIA ☐ IIB	3533000-400	Mission Systems Engg	VFCA 41711
DOCUMENT NO.(S) FOR IIB CHANGE			

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	DATE
			RESP SPEC ACT.			PROGRAM MGMT Blankenship	44-29	1/23/79

CLASS IIB RELEASE AUTHORIZATION

EFFECTIVITY	CONTRACT NO.	MANUFACTURING	DATE
DISPOSITION OF ITEMS	CUSTOMER DATE	ENGRG CHANGE CTR	DATE

252 CS OCT 72

WALK-IN CRB 1-23-79

ENGINEERING CHANGE ANALYSIS SHEET 2	HUGHES CODE IDENT 52577	ECA NO.	REV
		SHEET 2 OF 2	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LET
3533000-400		✓					

RELATED FACTORS AFFECTED

WHEN A FACTOR IS CHECKED YES, EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES
SPECIFICATION, CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES	
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION	
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM	
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X		
INTERCHANGEABILITY		X	INTERFACE	X			
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X		
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X		

ENGINEERING CHANGE PROPOSAL (ECP) (MSFC Form 436-453-481 for instructions)

DATE PREPARED: 3/31/80 | ECP NO.: 11A | PROCURING ACTIVITY NO.:

2. ORIGINATOR NAME AND ADDRESS	3. CAGE CODE	4. CLASS OF ECP	5. PRIORITY CODE	6. PRIORITY
Hughes Aircraft Company Culver City, California 90230	82577	1		

7. SPECIFICATIONS AFFECTED		8. DRAWINGS AFFECTED		
GOVT. CODE	SPECIFICATION/DOCUMENT NO.	GOVT. CODE	NO./DWG	REV.
		HAC	3533000-400	B

9. TITLE OF CHANGE

SPECIFY THE LOCATION OF THE THEMATIC MAPPER PURGE FITTING.

10. CONTRACT NO. & LINE ITEM: NAS 5-24200

11. CONFIGURATION ITEM NOMENCLATURE

THEMATIC MAPPER INTERFACE CONTROL DRAWING, #3533000-400B

11. IN PRODUCTION: [XX] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: MAIN FRAME

13. PART NO. OR TYPE DESIGNATION: 50840

14. DESCRIPTION OF CHANGE

PROVIDE MISSING DIMENSIONS TO SPECIFY THE LOCATION OF THE THEMATIC MAPPER PURGE FITTING. ENGINEERING CHANGE ANALYSIS No. 467126 FOR INTERFACE CONTROL DRAWING NO. 3533000-400 REVISION B, SUBMITTED HEREWITH.

15. REASON FOR CHANGE

LOCATION OF PURGE FITTING MUST BE KNOWN FOR DESIGN OF TESTING AND SUPPORT EQUIPMENT. IT IS ALSO REQUIRED FOR THE GE INTERFACE STAGE RELEASE SYSTEM.

16. EFFECT ON ASSOCIATED EQUIPMENT

PURGE LINES MUST ACCOMMODATE PURGE FITTING LOCATION.

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
ENGINEERING, PROTOFLIGHT, AND FLIGHT MODELS.	NONE
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED KIT DELIVERY SCHEDULE**
NOT REQUIRED	N/A

21. ESTIMATED COSTS/SAVINGS

NO COST

22. ORIGINATING ACTIVITY APPROVAL/DISAPPROVAL	TITLE
R. JONES	THEMATIC MAPPER PROGRAM MANAGER

23. APPROVAL/DISAPPROVAL

COGNIZANT ACTIVITY	SIGNATURE	DATE
LANDSAT-D PROJECT OFFICE	Frank L. Burnett	4/25/80

DD FORM 1693

Engineering Change Proposal SHEET 2		(3 digit) 11	REV
		SHEET 2 OF 2	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-400	B	ECA 467126					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP ETC.	X		SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT, MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY	X		INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY	X		SUPPORT EQUIPMENT	X				

ENGINEERING CHANGE PROPOSAL (ECP) (See 376-370-401 for Instructions)

DATE PREPARED: 11/6/79

ECP NO.: 12

PROCURING ACTIVITY NO.:

ORIGINATOR (Name and Address): Hughes Aircraft Company, Culver City, California 90230

CAGE CODE: 82577

CLASS OF ECP: I

PRIORITY CODE:

SPECIFICATIONS AFFECTED		DRAWINGS AFFECTED	
MFR CODE	SPEC OR DRAWING NO.	NUMBER	REV.
HAC	3533000-400 REV. "B"		

5. TITLE OF CHANGE: ADDITION OF COLOR CODING FOR J5-J8, AND POLARIZING FOR J1-J8

6. CONTRACT NO. & LINE ITEM: NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE: THEMATIC MAPPER

11. IN PRODUCTION: ☐ YES ☐ NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: 3533003-100

13. PART NO. OR TYPE DESIGNATION: 3533000-100

14. DESCRIPTION OF CHANGE:

THE THEMATIC MAPPER (TM) INTERFACE DRAWING WILL NOW SHOW COLOR CODING FOR CONNECTORS J5-J8 AND MASTER POLARIZING KEY POSITIONS FOR CONNECTORS J1-J8.

15. REASON FOR CHANGE:

TO CONFORM TO INTERFACE SPECIFICATION IS32015-100A

16. EFFECT ON ASSOCIATED EQUIPMENT:

17. PRODUCTION EFFECTIVITY BY SERIAL NO.: ENGINEERING, PROTOFLIGHT & FLIGHT MODELS

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE: NONE

19. RECOMMENDED RETROFIT EFFECTIVITY: ENGINEERING MODEL

20. ESTIMATED KIT DELIVERY SCHEDULE: N/A

21. ESTIMATED COSTS/SAVINGS: NONE

22. SUBMITTED BY (Typed Name and Signature): [signature] TITLE: ASST PROGRAM MGR TM

23. APPROVAL DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1693 GA 104.3A

ENGINEERING CHANGE ANALYSIS
SHEET 1

HUGHES

ECA NO. 46123S-L | REV
☐ COMPLETE ☐ ADVANCE | SH 1 OF 2

OGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECR NO. / CONTRACT NO.
LS 23C	THEMATIC MAPPER	3533000-100	P-31506 / NAS 5-24200

CM CLASS	URGENCY	RELATED ECA NO. (S)
I	IMMEDIATE	

SC LINE AFFECTED

PRODUCT BASE LINE AFFECTED AND CHANGE IS:
☐ PRODUCTION ONLY ☑ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

PECIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED
3533000-400B							

TLE OF CHANGE
ADDITION OF COLOR CODING FOR CONNECTORS J5-J8, AND ADDITION OF POLARIZING KEY FOR CONN. J1-J8

RELATED FACTORS ON SH 2 ARE AFFECTED ☒ YES ☐ NO

SCRIPTION OF CHANGE
COLOR CODING AND POLARIZING POSITIONS WILL BE INCORPORATED INTO THE TM INTERFACE DRAWING

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IST ATION FOR CHANGE
TO CONFORM TO INTERFACE SPEC IS 32015-100A

CTENT OF TESTING
DONE

RECM CHANGE EFFECTIVITY
PF AND F

RECM DISPOSITION OF ITEMS

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE
D. Sauer	40-42	11/6/79			
[illegible]	49-29	11/6/79	DEPARTMENT MGR		
W. Thompson D. Nead	46-20	11/13/79	CONFIG MGMT OFFICE [illegible]	44-29	12/5/79
			PROGRAM MANAGER		

REQUIRED:
ECAE ☐ YES ☒ NO
MAEC ☐ YES ☒ NO
SAEC ☐ YES ☒ NO

CHANGE APPROVAL

	ORG CODE	DATE		ORG CODE	DATE
☒ APPROVED					
☐ REJECTED			CHANGE REVIEW BOARD CHR. [illegible]	SBEC	11/27

AUTHORIZATION FOR RELEASE

PROPOSAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE CTR	DATE

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ENGINEERING CHANGE ANALYSIS SHEET 2

HUGHES
CODE IDENT 52577

ECA NO. 167235-2 | REV

SHEET 2 OF 3

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
3533000-400							

RELATED FACTORS AFFECTED

WHEN A FACTOR IS CHECKED YES, EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION, CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY	X		INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT					

ECR/ECA/ECAE CONTINUATION SHEET	HUGHES — HUGHES AIRCRAFT COMPANY CODE IDENT 62577	☐ ECR ☒ ECA ☐ ECAE	
		NO. 467235-2 REV	SH NO. 3

L IN ...MATION ENTERED HEREON SHALL BE IDENTIFIED BY THE APPROPRIATE BLOCK HEADING FROM THE ECP, ECA, OR EC/

DWG 3533000-400

AND VIEW L-L

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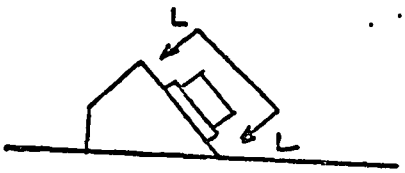
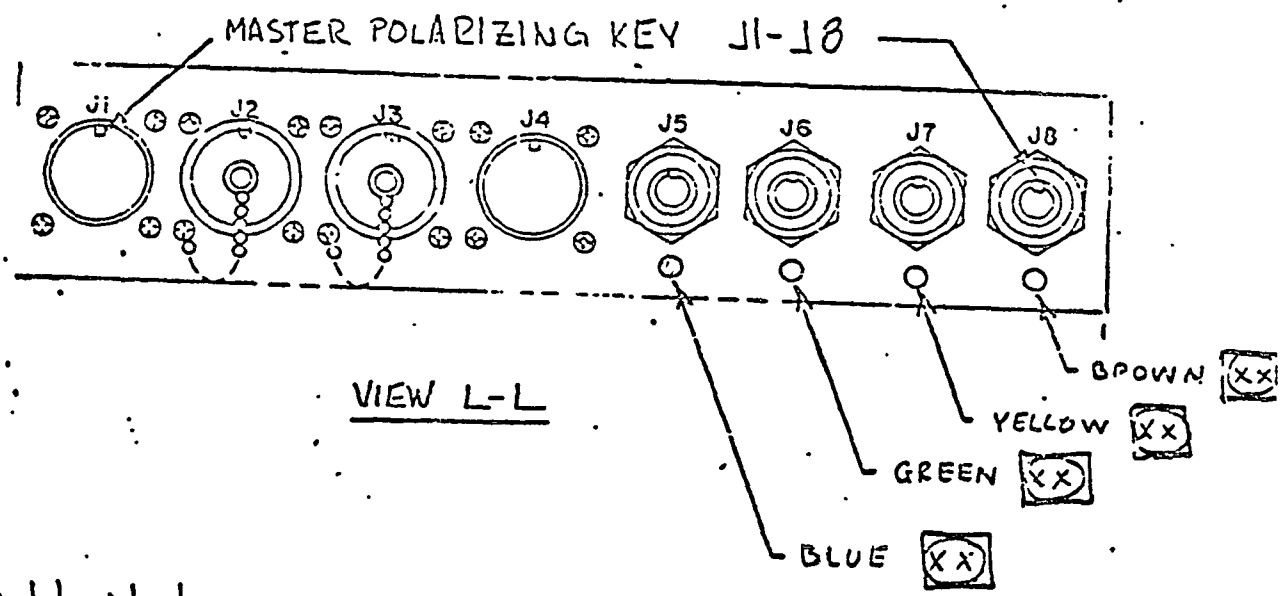


VIEW L-L



VIEW L-L

Add Note

XX "Spacecraft mating electrical connector shall be color coded with the same colors for J5 through J8."

(XX Note number to be defined upon incorporation)

2

ENGINEERING CHANGE REQUEST

HUGHES
HUGHES AIRCRAFT COMPANY
CODE IDENT 82577

ECR NO. — 831506

SHEET 1 OF 2 SHEETS

REQUEST

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	SPECIFICATION/DWG NO.(-)
HS 236	THEMATIC MAPPER	THEMATIC MAPPER 3533000-100	INTERFACE CONTROL DRAWING TM 3533000-400

DESCRIPTION OF PROBLEM

INTERFACE CONTROL DRAWING DOES NOT SHOW MASTER POLARIZING KEYS FOR MUX CONNECTORS (J1-J8), NOR COLOR CODING FOR J5 THRU J8.

PROPOSED SOLUTION

ADD VIEW TO SHOW MASTER POLARIZING KEYS AND COLOR CODING.

REQUESTED BY	EXT	BLDG.M/S	ORG CODE	DATE	URGENCY
[illegible]	[illegible]	[illegible]	10-92		ROUTINE
APPROVED					RECM EFF: PF & FLT
APPROVED					RECM DISP OF ITEMS: None

DISPOSITION

[✓ ACCEPTED] [illegible] REASON FOR REJECTION

[ ] REJECTED

DATE RECD IN ECC | SCH REPLY DATE | ADVANCE ☐

CHANGE CLASS ☒ I ☐ IIA ☐ IIB	SPECIFICATION OR CONTROL ITEM	RESP SPEC ACT. OR RESP ENGRG ACT.	ECA NUMBER
DOCUMENT NO.(S) FOR IIB CHANGE		Julian ECA	467[illegible]5
		McLaughlin ECA	—

	ORG CODE	DATE		ORG CODE	DATE	RESP ENGRG ACT.	ORG CODE	DATE
			RESP SPEC ACT.			PROGRAM MGMT [illegible]	44-2?	12/1[illegible]

CLASS IIB RELEASE AUTHORIZATION

CHANGE EFFECTIVITY	CONTRACT NO.		MANUFACTURING	DATE
DISPOSITION OF ITEMS	CUSTOMER	DATE	ENGRG CHANGE CTR	DATE

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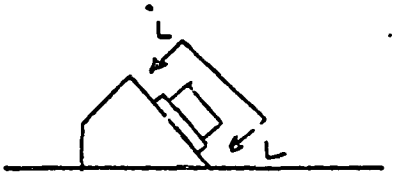
ECR 881506

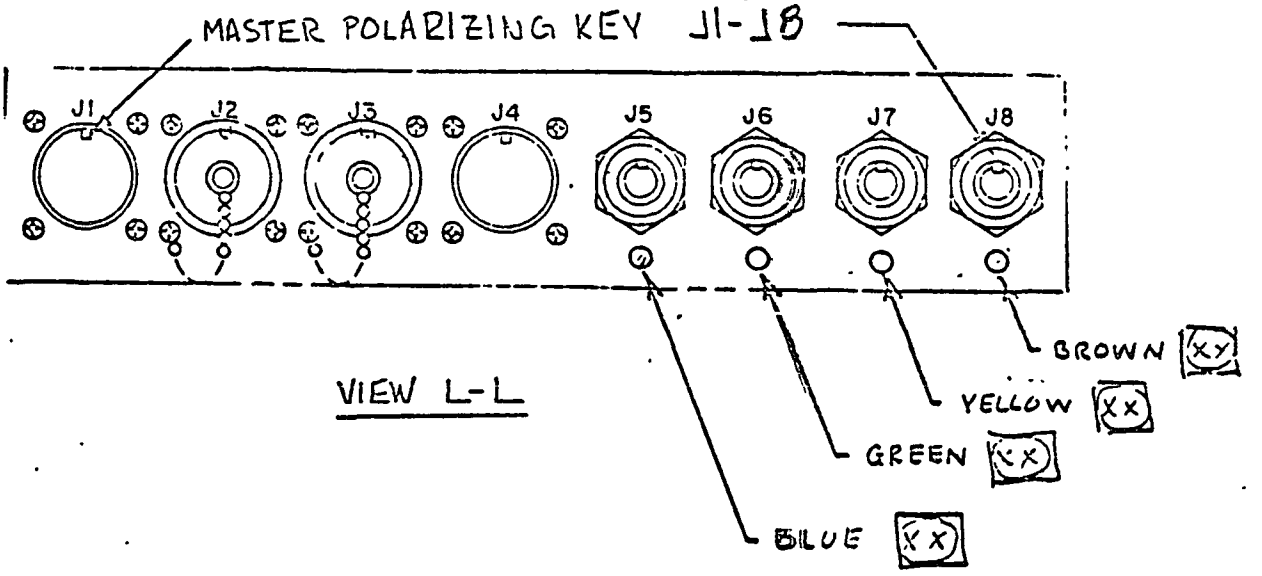
SHEET 2 OF 2

DWG 3533000-400

ADD VIEW L-L



VIEW L-L



VIEW L-L

Add Note

(X) "Spacecraft mating electrical connector shall be color coded with the same colors for J5 through J8."

(XX Note number to be defined upon incorporation)

ENGINEERING CHANGE PROPOSAL (SHORT FORM)
(SEE MIL-STD-480 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
	013	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
Hughes Aircraft Company	82577	I		

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
		HAC	3533000-400	C

8. TITLE OF CHANGE	9. CONTRACT NO. & LINE ITEM
Revise Thematic Mapper Interface Control Drawing from Revision B to Revision C.	NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE	11. IN PRODUCTION
Thematic Mapper	[✓ YES] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	13. PART NO. OR TYPE DESIGNATION
Thematic Mapper 51065	3533000-100

14. DESCRIPTION OF CHANGE

Revise Thematic Mapper Interface Control Drawing from Revision B to Revision C.

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15. NEED FOR CHANGE

Various design modifications require changes to the Thematic Mapper interface requirements. See attached engineering documentation.

16. EFFECT ON ASSOCIATED EQUIPMENT

No major effect

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
Protoflight and Flight Models	None
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED KIT DELIVERY SCHEDULE**
Protoflight and Flight Models	N/A

21. ESTIMATED COSTS/SAVINGS

No cost change /

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
[illegible]	PROGRAM MANAGER

23. APPROVAL/DISAPPROVAL

CONTRACTING OFFICER [illegible] 8/14/80

GOVERNMENT ACTIVITY	SIGNATURE	DATE
LANDSAT-D PROJECT	[illegible]	7/3/80

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Engineering Change Proposal SHEET 2		ECP NUMBER 013	REV
		SHEET 2 OF 2	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED ECA No.	DELETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED ECA No. (cont'd)	DELETED
3533000-400	C	467096-1A		3533000-400	C	467289	
		467106				467290	
		467126A				467282	
		467156-1					
		467198					
		467235-2					
		467236					
		467248-3A					
		467263-1					
		467286					
		467287					
		467288					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE	X		OPERATING INSTALLATION	X		PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES	X		OTHER SYSTEMS		X			
INTERCHANGEABILITY	X		INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT	X				

40/52833

ENGINEERING CHANGE PROPOSAL (ECP) (SHORT FORM) (SEE 316-379-481 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
27 August 1980	14	

1. ORIGINATOR NAME AND ADDRESS	2. CAGE CODE	3. CLASS OF ECP	4. PRIORITY CODE
Hughes Aircraft Company	82577	I	

6. SPECIFICATIONS AFFECTED

SPEC. CODE	SPECIFICATION/DOCUMENT NO.	SPEC. CODE	SPECIFICATION/DOCUMENT NO.
HAC	3533000-100		

7. DRAWINGS AFFECTED

NUMBER	REV.

8. TITLE OF CHANGE

Coherent Noise Specification Change

9. CONTRACT NO. & LINE ITEM

NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE

Thematic Mapper

11. IN PRODUCTION

[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED

13. PART NO. OR TYPE DESIGNATION

3533000-100

14. DESCRIPTION OF CHANGE

Revise GSFC 400.8-D-210, Revision B, paragraphs 3.2.9.1 and 4.2.3, to read as indicated on the attached sheets.

15. REASON FOR CHANGE

See attached engineering documentation (HS236-6859).

16. EFFECT ON ASSOCIATED EQUIPMENT

No effect on TM

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
Protoflight and Flight Models	None
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED GFE DELIVERY SCHEDULE**
Protoflight and Flight Models	N/A

21. ESTIMATED COSTS/SAVINGS

No cost change

22. APPROVAL/DISAPPROVAL	
FOR: L. R. Tarver	Program Manager - Thematic Mapper

GOVERNMENT ACTIVITY	SIGNATURE	DATE
NASA/GODDARD SPACE FLIGHT CENTER	Elizabeth Pentecost	1-12-81

DD FORM 1693 GA 4104-3A

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Engineering Change Proposal SHEET 2		14	REV
		SHEET 2 OF 6	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DELETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DELETED
GSFC 400.8-D-210 B		paragraphs 3.2.9.1					
		4.2.3					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		ENG (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE		X			
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS	X				
MAINTAINABILITY		X	SUPPORT EQUIPMENT	X				

Paragraph 3.2.9.1 shall be changed to read as follows:

3.2.9.1 Radiometric Sensitivity

The TM output in each of the bands 1 through 5 and 7 shall have a signal-to-noise ratio (SNR) for specified input in accordance with Table IV. For a constant input radiance, the SNR is defined as the ratio of the output value (in units of radiance) averaged over at least one hundred samples to the root mean squared (RMS) value of the noise equivalent radiance which is defined as the RMS of the deviations of the output samples from the average value. All SNR measurements shall be taken with the processing electronics in a linear gain mode except for those bands where quantizing noise precludes meeting the SNR requirements.

TABLE IV

Band No.	Constant In Band Input Radiance (mw/cm^2-sr)	Minimum SNR
1	0.28	32
2	0.24	35
3	0.13	26
4	0.19	32
5	0.08	13
7	0.046	5

The sensitivity of Band 6 is measured in terms of noise equivalent temperature difference (NETD) defined in 6.1. The NETD for Band 6 for an extended scene at a temperature of 300 K is 0.5 K. The minimum scene temperature for this band is 260 K.

The TM output shall have negligible coherent noise in all seven bands for all values of radiance including zero. The coherent noise pattern shall be subjectively evaluated by inspecting photographic images. No coherent noise pattern shall be discernible at any radiance/signal level with the display set so that each quantizing level from 0 to 1/4 of full scale is visible for Bands 1-5, 7 and 4 quantizing levels spread over the dynamic range are visible for Band 6.

Paragraph 4.2.3 shall be changed to read as follows:

4.2.3 Pictorial Displays

The contractor shall produce pictorial outputs using the BTCE or capital (facility) equipment.

The pictorial display used for testing all spectral bands may utilize a one dimensional target. The purpose of this test is to evaluate the coherent noise of the system, usually only obvious on an image and when viewing a mid-range, diffuse scene. The input radiance for this display shall increase slowly from 0 to full scale. The rate of change of radiance shall be slow enough to allow relatively constant levels of radiance for at least 10 scans. No coherent noise shall be visible. This type of noise is objectionable if it can be seen by the unaided eye of a trained observer in a picture that is at least eight inches on a side.

An acceptable alternative test method would involve scanning a scene with a radiance gradient which allows approximately ten samples at each quantizing level over the lowest 1/4 of the dynamic range for Bands 1-5, 7. Band 6 would involve scanning a scene with constant radiance for at least four different radiance levels spread over its dynamic range. No coherent noise shall be visible.

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO: Jack Engel

CC: Data Bank (11)
Distribution

DATE: 16 June 1980

REF: ES 236-6859

SUBJECT: Coherent Noise Testing

FROM: Rick Osgood

BLDG. 761 MAIL STA. 79
EXT. 4262

Some deviations from the NASA Spec. are being implemented in BL-12R (Coherent Noise) testing. The method of testing relative to these changes is as follows:

1. A minimum of 64 pcm levels (0-64 MUX levels) rather than the full dynamic range will be required to be displayed (Bands 1-5, 7) for coherent noise testing.

2. The data pertinent to 1. (above) will be represented by differences from the intensity gradient.

3. Only 4 pcm levels, spread over the dynamic range, will be used in Band 6 testing.

4. A pictorial format smaller than 8" x 8" will be used to display coherent noise pictures. (An attempt will be made to make the pictures as large as possible, consistent with the data quantity.)

5. Coherent noise in Band 6 will be tested in the Thermal Balance Test with a full aperture plate. This will only be performed on the Engineering Model. (We will not test in the Protoflight and Flight models due to probable elimination of the aperture plate.)

The rationale for the above changes is as follows:

Items 1 and 2 eliminate the need for the four-color option on the Optronics Laser Writer making the coherent noise pictures easier to read. (The four-color option is necessary since the film has only 64 distinct densities.)

Item 1, furthermore, eliminates a radiance gradient ramping problem. That is, the flooding lamp can deliver 0-64 MUX levels or greater, filling the entire video scan line. (Otherwise, we have to adjust lamp currents and the band may still saturate before the end of scan line.)

Item 1 also eliminates a lamp lifetime problem. (Presently, to get close to the minimum saturation level, the current in the calibrator flooding lamp has to be so high that pitting

of tungsten occurs on the envelope and the lamp lifetime is reduced.

Item 3 is necessary to eliminate collecting a large amount of data and producing a large number of pictures.

Rick Osgood

/ldb

Distribution:

A. S. Chapman
W. L. Conover
K. W. Hubbard
T. P. Sciacca

ENGINEERING CHANGE PROPOSAL (ECP) (SHORT FORM) (SEE EIA-STD-649 FOR INSTRUCTIONS)

DATE PREPARED

ECP NO. 015

PROCURING ACTIVITY NO.

1. ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company

2. CAGE CODE 82577

3. CLASS OF ECP I

4. PRIORITY

5. SPECIFICATIONS AFFECTED

SPEC. CODE	SPECIFICATION/DOCUMENT NO.
HAC	IS 32015-001
GSFC	400-8-D-201

6. DRAWINGS AFFECTED

DWG. CODE	NUMBER	REV.

7. TITLE OF CHANGE
Add In-Plane and Out-of Plane motion requirement for spacecraft mounting surfaces provided for Thematic Mapper installation

8. CONTRACT NO. & LINE ITEM
NAS 5-24200

9. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper

10. IN PRODUCTION
[X] YES [ ] NO

11. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper

12. PART NO. OR TYPE DESIGNATION
3533000-100

13. DESCRIPTION OF CHANGE

Add requirements to the spacecraft interface specifications so as to limit the relative motion of the Thematic Mapper mounting locations during the pre-launch, launch and on-orbit environments

14. REASON FOR CHANGE

Spacecraft mounting points relative motion must be limited to prevent excessive stresses in the Thematic Mapper structure

15. EFFECT ON ASSOCIATED EQUIPMENT
None

16. PRODUCTION EFFECTIVITY BY SERIAL NO.
Protoflight and Flight Models

17. EFFECT ON PRODUCTION DELIVERY SCHEDULE
None

18. RECOMMENDED RETROFIT EFFECTIVITY
Protoflight and Flight Models

19. ESTIMATED KIT DELIVERY SCHEDULE
N/A

20. ESTIMATED COST/SAVINGS
No cost change

21. ORIGINATING ACTIVITY AUTHORIZING SIGNATURE
D. L'Heureux

TITLE
Manager, Contracts
NASA Systems Division

22. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1693 CA 810430

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Engineering Change Proposal SHEET 2		ECP NUMBER 015	REV
		SHEET 2 OF 3	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DELETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DELETED
IS 32015-001	A	✓					
GSFC 400.8-D-201		✓					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X			

Change GSFC 400.8 - D - 201, Section 4.5 as follows:

1. Delete the last sentence in the section and add the following:

The thematic mapper mounting fasteners shall be the responsibility of the spacecraft contractor.

The spacecraft Instrument Module shall provide mounting surfaces to which the TM shall be installed. These mounting surfaces and TM mounting provisions shall conform to the requirements of the TM Interface Control Drawing, 3533000-400 and the requirements in Table 4.5, below.

Table 4.5 Maximum Spacecraft Mounting Location Displacement

Environment	Maximum Out-of-Plane Displacement (inches)	Maximum In-Plane Displacement (inches)
At TM installation	0.001*	0.002
During Launch	0.016	0.019
On-Orbit	0.004	0.008

* Limited shimming by the spacecraft contractor may be required.

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ENGINEERING CHANGE ANALYSIS SHEET 1 | **HUGHES** CODE IDENT 81755 | ECA NO. 467313 | REV –

☒ COMPLETE ☐ ADVANCE | SH 1 OF 3

PROGRAM	SYS/EQUIP NAME OR DES	CONTROL ITEM NAME & NO.	ECR NO.
HS 236	Thematic Mapper	Thematic Mapper 3533000 - 100	831335
			CONTRACT NO. NAS5-24200

RECM CLASS	URGENCY	RELATED ECA NO. (S)
I	Immediate (ECP Required)	

BASE LINE AFFECTED: Protoflight & Flight

PRODUCT BASE LINE AFFECTED AND CHANGE IS: ☒ PRODUCTION ONLY ☐ PRODUCTION AND RETROFIT ☐ RETROFIT ONLY

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NO.	NEW	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NO	NEW	CHANGED	DE-LETED
IS 32015-001		–					

TITLE OF CHANGE: Add In-Plane/Out-of-Plane Mounting Requirements

RELATED FACTORS ON SH 2 ARE AFFECTED ☒ YES ☐ NO

DESCRIPTION OF CHANGE

- Add requirements on the spacecraft so as to limit its mounting surface motion during the launch and on orbit environments.

change Paragraph 3.4.5 as shown on page 3 of this ECA.

JUSTIFICATION FOR CHANGE

Spacecraft mounting points relative motion must be limited to prevent excessive stresses in the TM structure

EXTENT OF TESTING: No Additional Testing

RECM CHANGE EFFECTIVITY: PF & FLT

RECM DISPOSITION OF ITEMS: N/A

APPROVAL FOR EVALUATION

	ORG CODE	DATE	RSA OR REA	ORG CODE	DATE
J.D. Mc Laughlin	44-29	30 Sept 80			
			DEPARTMENT MGR		
			CONFIG MGMT OFFICE		
			PROGRAM MANAGER		

REQUIRED:
ECAE ☐ YES ☒ NO
MAEC ☐ YES ☐ NO
SAEC ☐ YES ☐ NO

CHANGE APPROVAL

		ORG CODE	DATE		ORG CODE	DATE
☐ APPROVED						
☐ REJECTED						
				CHANGE REVIEW BOARD CHM	22-61	10/1/80

AUTHORIZATION FOR RELEASE

PROPOSAL NO.	CHG CLASS	CHANGE EFFECTIVITY	CUSTOMER	DATE
CONTRACTUAL AUTH	☐ ADVANCE TO COMPLETE	DISPOSITION OF ITEMS	ENGRG CHANGE CTR	DATE

9253A CS OCT 75

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ENGINEERING CHANGE ANALYSIS SHEET 2		ECA No. 467 313	REV -
		SHEET 2 OF 3	

SPECIFICATIONS AND ENGINEERING DRAWINGS AFFECTED

SPECIFICATION OR DRAWING NUMBER	REV	CHANGED	DE-LETED	SPECIFICATION OR DRAWING NUMBER	NEW	CHANGED	DE-LETED
IS 32015-001	•	✓					

RELATED FACTORS AFFECTED — WHEN A FACTOR IS CHECKED YES EXPLAIN BELOW OR ON A CONTINUATION SHEET

FACTOR	YES	NO	FACTOR	YES	NO	FACTOR	YES	NO
SPECIFICATION, CONTRACTUALLY APPLICABLE	X		EMI (RFI)		X	MATERIALS & PROCESSES		X
PERFORMANCE		X	OPERATING INSTALLATION		X	PARTS APPLICATION		X
SAFETY		X	GFAE, GFE, GFP, ETC.		X	SUBCONTRACTOR DEVELOPED ITEM		X
WEIGHT/MASS PROPERTIES		X	OTHER SYSTEMS		X			
INTERCHANGEABILITY		X	INTERFACE	X				
RELIABILITY		X	OPERATIONAL COMPUTER PROGRAMS		X			
MAINTAINABILITY		X	SUPPORT EQUIPMENT		X			

ECA 467313
ECR 831335
sheet 3 of 3

In IS32015-001, Paragraph 3.4.5: Delete the last two sentences and add the following:

The TM mounting fasteners are the responsibility of the SPACECRAFT CONTRACTOR.

The spacecraft Instrument Module shall provide mounting surfaces to which the TM shall be installed. These mounting surfaces and TM mounting provisions shall conform to the requirements of the TM Interface Control Drawing, 3533000-400 and the requirements in Table 7.5, below.

Table 7.5 Maximum Spacecraft Mounting Location Displacements

Environment	Maximum Out-of-Plane Displacement (inches)	Maximum In-Plane Displacement (inches)
At TM Installation	0.001 *	0.002
During Launch	0.016	0.019
On-Orbit	0.004	0.008

* Limited shimming by the spacecraft contractor may be required.

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

FILE

APR 17 1981

Reply to Attn of 283

Hughes Aircraft Company
Attention: Mr. E. A. Dawson
Space and Communications Group
NASA Systems Division
P. O. Box 92919
Los Angeles, CA 90009

Subject: Contract NAS 5-24200, Engineering Change Proposal (ECP) No. 16

Reference: Hughes Aircraft Company (HAC) HS236/0019-1127, dated December 12, 1980

The subject ECP has been reviewed by the NASA Goddard Space Flight Center (GSFC) and is rejected as submitted. The specification changes proposed by HAC would require substantial additional explanation and the numbers in column 2 of Table III b) would have to be revised. Rather than HAC revising and resubmitting this ECP, we will initiate a Configuration Change Request (CCR) to be processed through the Landsat-D Configuration Control Board (CCB) to change the last sentence of Specification 400.8-D-210, section 3.2.8.1 from "component testing...and analysis" to "test and analysis." This change to the specification wording will allow HAC to proceed with the spectral matching test as planned Subsequent to approval of the CCR by the Landsat-D CCB, a contract modification will be issued incorporating this specification change.

I have been informed that the appropriate HAC technical personnel have concurred with the above. If there are any further questions on this subject, please do not hesitate to contact me.

Elizabeth Austin

Elizabeth Austin
Landsat-D Project
Contracting Officer

ENGINEERING CHANGE PROPOSAL (SHORT FORM) (See MIL-STD-481 for instructions)

DATE PREPARED: 4 FEB 81

ECP NO.: 017

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS: Hughes Aircraft Company

2. CAGE CODE: 82577

3. CLASS OF ECP: I

4. CAGE CODE: 5. FACILITY

6. SPECIFICATIONS AFFECTED

APPR. CODE	SPECIFICATION/DOCUMENT NO.	APPR. CODE
GSFC	GSFC 400.8-D-201	

7. DRAWINGS AFFECTED

NUMBER	REV.

8. TITLE OF CHANGE: Revise the specification for spacecraft 28vdc power supplied to Thematic Mapper from 21vdc - 35vdc, to 23vdc - 25vdc.

9. CONTRACT NO. & LINE ITEM: NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE: Thematic Mapper

11. IN PRODUCTION: [X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: Thematic Mapper

13. PART NO. OR TYPE DESIGNATION: 50869

14. DESCRIPTION OF CHANGE

Revise the specification for the 28vdc power supplied to the Thematic Mapper to be 28vdc + 7vdc, -5vdc, instead of 28vdc ±7vdc. Page 2 of this ECP specifies the proposed changes to the GSFC 400.8-D-201 specification section

Continued on page 2

15. NEED FOR CHANGE: The present specification for bus voltage, 28vdc ± 7vdc, does not allow for proper operation of the TM power supply. The power supply will not regulate properly at bus voltages below 23vdc. The technical personnel at GSFC, who are aware of this condition, have indicated that the spacecraft 28vdc power bus will be above 23vdc in all normal operating situations.

16. EFFECT ON ASSOCIATED EQUIPMENT: None

17. PRODUCTION EFFECTIVITY BY SERIAL NO.: Protoflight and Flight Models

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE: None

19. RECOMMENDED RETROFIT EFFECTIVITY: Protoflight and Flight Models

20. ESTIMATED KIT DELIVERY SCHEDULE: N/A

21. ESTIMATED COSTS/SAVINGS: No-cost change.

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE: X

TITLE:

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1693 GA 4104.3A

DESCRIPTION OF PROPOSED CHANGES TO GSFC 400.8-D-201:

1. Section 3.3.2.1

   A. Revise "...± 7vdc..." to read "...+ 7vdc, - 5vdc...".

2. Section 3.3.2.4

   A. Revise "...(may not stay within the 21-25 volt operation range)" to read "...(may not stay within the 23-35 volt operation range)"

   B. Revise "...(within the 21 to 35 volt operating range)" to read "...within the 23 to 35 volt operating range)".

3. Section 3.3.3.6

   A. Revise "...values of 35V, 28V and 21V." to read "...values of 35V, 28V and 23V."

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ENGINEERING CHANGE PROPOSAL (ECP) (MSFC FORM)
(SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED: 4 FEB 81

ECP NO.: 018

PROCURING ACTIVITY NO.:

1. ORIGINATOR NAME AND ADDRESS
Hughes Aircraft Company

2. CAGE CODE: 32577

3. CLASS OF ECP: I

4. PRIORITY CODE:

5. SPECIFICATIONS AFFECTED

SPEC. CODE	SPECIFICATION/DOCUMENT NO.	DOC. CODE
GSFC	GSFC 400.8-D-210	

7. DRAWINGS AFFECTED

NUMBER	REV.

8. TITLE OF CHANGE
Revise Thematic Mapper Maximum Weight from 243.2 Kg to 258 Kg

9. CONTRACT NO. & LINE ITEM
NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper

11. IN PRODUCTION
[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Thematic Mapper

13. PART NO. OR TYPE DESIGNATION
3533000-100

14. DESCRIPTION OF CHANGE
Revise GSFC 400.8-D-210 specification to increase the Thematic Mapper maximum specified weight to 258 Kg (568.79 pounds). The present maximum specified weight is 243.2 Kg (536.16 pounds).

Continued on page 2.
on page

15. NEED FOR CHANGE
On 1 DEC 80, the weight of the Thematic Mapper was 245.65 Kg, based upon about 96% actual weights of components and subassemblies. Based upon data from other space projects, the TM can expect to increase in weight about 5% per year until it is delivered. This growth rate relates to hardware in an integration and system test phase. Assuming a delivery of the TM in late September 1981, the expected weight growth since December 1980 would be about 12.30 Kg. Adding the 2.45 Kg deficit in December will bring the projecte weight deficit in September 1981 to 14.75 Kg (32.51 pounds). The present maximum specified weight plus the expected weight growth will sum to 257.95; say, 258 Kg.

16. EFFECT ON ASSOCIATED EQUIPMENT
None

17. PRODUCTION EFFECTIVITY BY SERIAL NO.
Protoflight and Flight Models

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
None

19. RECOMMENDED RETROFIT EFFECTIVITY
Protoflight and Flight Models

20. ESTIMATED KIT DELIVERY SCHEDULE
N/A

21. ESTIMATED COSTS/SAVINGS
No-cost change

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE / TITLE

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE
NASA/Goddard Space Flight Center		

DD FORM 1692

14. DESCRIPTION OF PROPOSED CHANGE TO GSFC 400.8-D-210:

1. Section 3.2.1 Configuration

a. Revise "...in no case shall this weight exceed 243.2 Kg. (535 lbs.)." to read "...in no case shall this weight exceed 258 Kg (568.8 lbs.)."

COORDINATION APPROVAL SIGNATURE:

CR Jonge					/

bcc: Dist. B: GC Benson, EF Carle, AH Connor, RL Cook, RC Cooley, JL Engel, EA Daws WH Freudenstein, BF Gritt, RL Julian, JC Kodak, LE Long, JD Love, AB Marchant, KC Nas [illegible] Nichols, FR Phillips, DM Randall, TP Sciacca, RJ Wilkerson, Data Bank (2), File

HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

17 June 1981

In reply refer to: 81(44)07001/D4596
HS236/0019-1287

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Elizabeth Austin
Contracting Officer
Code: 283

Subject: Contract NAS5-24200 for Thematic Mapper;
Engineering Change Proposal (ECP) No. 019

Reference: Hughes letter HS236/0019-1239, E. A. Dawson to Elizabeth Austin, dated 8 May 1981

The subject Engineering Change Proposal (ECP), submitted on 8 May 1981, requested a revision to Specification GSFC 400.8-D-210, Revision B pertaining to shipment of the Thematic Mapper by Air Freight. The Hughes Program Office has initiated efforts to make the shipping container compatable with the shipment by air freight requirements. It is therefore requested that ECP Number 019 be cancelled, and that no further action be taken by the Goddard Configuration Control Board regarding this matter.

If you have any questions, please call me.

Very truly yours,

HUGHES AIRCRAFT COMPANY

E. A. Dawson
Head, Contracts
NASA Systems Division

/mc

ENGINEERING CHANGE PROPOSAL (ENGR PCP)
(See SSL-3.5-031 FOR INSTRUCTIONS)

DATE PREPARED: 20 August 1981

ECP NO.: 020

PROCURING ACTIVITY NO.:

ORIG. CONTR. NAME AND ADDRESS
Hughes Aircraft Company

CAGE CODE: 82577

CLASS OF ECP: I

PRIORITY CODE:

6. SPECIFICATIONS AFFECTED

MFR. CODE	SPECIFICATION/DRAWING NO.	REV. CODE
GSFC	GSFC 400.8-D-201	
GSFC	GSFC 400.8-D-210	

7. DRAWINGS AFFECTED

NUMBER	REV.

8. TITLE OF CHANGE

Increase electrical power allocation for the Thematic Mapper.

9. CONTRACT NO. & LINE ITEM

NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE

THEMATIC MAPPER

11. IN PRODUCTION

[XX] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED

THEMATIC MAPPER

13. PART NO. OR TYPE DESIGNATION

3533000-100

14. DESCRIPTION OF CHANGE

Revise GSFC 400.8-D-201, and GSFC 400.8-D-210 to increase the electrical power allocation to the Thematic Mapper as follows:

Peak Power	400 Watts
Maximum Average Power (Picture Mode)	350 Watts
Maximum Standby Power (Launch mode, no change)	100 Watts

Continued on Page 2

15. NEED FOR CHANGE

During system testing, the engineering and protoflight models of the Thematic Mapper have consumed approximately 335 watt average power in the picture mode, and 94 watts in the standby mode. The present specification requirements are respectively 300 watts, and 75 watts. The GSFC technical personnel are aware of this condition, and have been advised that an engineering change proposal would be submitted to request that additional power be provided for Thematic Mapper.

16. EFFECT ON ASSOCIATED EQUIPMENT

NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.

Engineering/Protoflight/Flight Models

18. EFFECT ON PRODUCTION DELIVERY SCHEDULE

NONE

19. RECOMMENDED RETROFIT EFFECTIVITY

N/A

20. ESTIMATED KIT DELIVERY SCHEDULE

N/A

21. ESTIMATED COSTS/SAVINGS

No-Cost Change

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE

C. Richard Chin

TITLE: Program Manager

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY: NASA/GSFC

SIGNATURE: F. A. Hartz Dist.

DATE: 3/15/82

(Continued from Page 1, Block #14)

1. Description of proposed change to GSFC 400.8-D-201, Section 3.3.2.2, Power Output (available to Thematic Mapper).

   REVISE: "Maximum operational - 300 watts" -- to read...

   TO READ: "a. Peak Power: 400 watts
   b. Maximum Average Power (Picture Mode): 350 watts
   c. Maximum Standby Power: 100 watts
   d. Launch Mode Power: 14 watts"

2. Description of proposed change to GSFC 400.8-D-210, Section 3.3.43, Power Supply.

   REVISE: "The basic power characteristics shall be in accordance with the ICD. Total power consumption of the TM instrument shall not exceed 300 watts, including thermal control power, if required. A non-operating orbital standby mode shall exist in which the TM consumes no more than 75 watts and is maintained at a temperature adequate to prevent instrument damage." -- to read...

   TO READ: "The basic power characteristics shall be in accordance with the ICD. The peak power consumption of the TM instrument shall not exceed 400 watts, including thermal control power, if required. The maximum average power consumption of the TM in the picture mode shall not exceed 350 watts. A non-operating orbital standby mode shall exist in which the TM consumes no more than 100 watts, and is maintained at a temperature adequate to prevent instrument damage."

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ENGINEERING CHANGE PROPOSAL (SHORT FORM)
(SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
18 NOV 1981	021	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
SANTA BARBARA RESEARCH CENTER 75 COROMAR DR. GOLETA, CAL. 93117	11323	I		

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
GSFC	GSFC 400.8-D-201	11323	52347	B + EO 2781A

8. TITLE OF CHANGE
Connection of Thematic Mapper Unipoint Signal Ground To Chassis Ground within Thematic Mapper Electronics Module

9. CONTRACT NO. & LINE ITEM
NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE
Thematic Mapper Assy

11. IN PRODUCTION
[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED
Electronics Module Assy-TM

13. PART NO. OR TYPE DESIGNATION
52347

14. DESCRIPTION OF CHANGE

Addition of 2 26 AWG wires from A26E01 terminal (TM Unipoint signal ground) to physically nearest chassis ground screw.

REF: Attached SBRC EO 3903A

15. NEED FOR CHANGE

To lessen the general level of noise exhibited in Thematic Mapper video data, Oscar Weinstein, GSFC Technical Officer, directed the above defined grounding system.

16. EFFECT ON ASSOCIATED EQUIPMENT

NONE

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
PROTOFLIGHT/FLIGHT	NONE
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED SIT DELIVERY SCHEDULE**
51065 SERNO 002	N/A

21. ESTIMATED COSTS/SAVINGS

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE | **TITLE**

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE

DD FORM 1 DEC 68 1693 S/N-0102-030-6900

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SBRC ENGINEERING ORDER / ~~REVISION NOTICE~~ NO. 3903A

CODE IDENT 11323 SHEET 1 OF 1

DRAWING TITLE	DRAWING NUMBER
ELECTRONICS MODULE ASSY T.M.	52347-B

PROJECT NUMBER	ITEM DISPOSITION	CLASS CHANGE	DRAWING TYPE
PL1162	REWORK ☒ ITEMS CONFORM ☐ NO ITEMS ☒ REJECT ☐ USE ☐ NOT APPLICABLE ☐	I ☒ II ☐	A ☒ B ☐

EFFECTIVITY 51065
SE :NO CO2 SUBQ

SUPERSEDING ECR NUMBER 53/01

REVISION STATUS THIS PRINT
NOT MAINTAINED AFTER
NOV 18 1981
DO NOT USE THIS PRINT
UNLESS YOUR ORDER OR INSTRUCTIONS SPECIFY THIS REVISION LEVEL SHOWN

DESCRIPTION OF CHANGE

1. ADDED TO L/M:

10	**	AR		SM80003-0109	WIRE, INSUL, 26 AWG, WHITE	*
10	**	1		MS35431-1	TERMINAL LUG, NO. 4	**

2. ADDED G/N S

*. SUBSEQUENT TO INSTALLATION OF ALL PWB ASSY'S INTO THE ELECTRONICS MODULE ASSEMBLY (52347) VERIFY THAT OPEN CIRCUIT (>1mΩ) EXISTS BETWEEN SIGNAL UNIPOINT RTN (AZ6 E01).

☒ (**) AT ONE END SOLDER TWO WIRES ITEM * TO TERMINAL LUG ITEM ** AND THE OTHER ENDS OF THE WIRE TO AZ6 E01 TERMINALS. LENGTH OF WIRES TO BE DETERMINED AT INSTALLATION USE EXISTING AZ6 BOARD MOUNTING HARDWARE TO TIE DOWN TERMINAL LUG ITEM **. (CONNECT THEMATIC MAPPER UNIPOINT SIGNAL GROUND TO ELECTRONICS MODULE CHASSIS GROUND).

* NOTE AND/OR ITEM NUMBER TO BE ASSIGNED AT TIME OF INCORPORATION.

PREPARED BY	DATE	QUALITY APPROVAL	DATE	RELEASED BY	DATE
	11/17/81		11-17-81		11-17-81
CHECKED BY	DATE	MANUFACTURING APPROVAL	DATE	INCORPORATED BY	DATE
	11/17/81				
REA/RSA APPROVAL	DATE	PROJECT APPROVAL	DATE	DRAWING REV LETTER	
A Barnach	11/17/81	for J Eckel	11/17/81		

SBRC FORM NO. 2314-1-75

ENGINEERING CHANGE PROPOSAL (SHORT FORM)
(SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
5/5/82	022	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
Santa Barbara Research Center 75 Coromar Drive, Goleta, CA 93117	11323	1		

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
GSFC	400.8-D-210 Rev. B			

8. TITLE OF CHANGE	9. CONTRACT NO. & LINE ITEM
Deletion of Power Supply Synchronization to the Multiplexer	NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE	11. IN PRODUCTION
Thematic Mapper System	[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	13. PART NO. OR TYPE DESIGNATION
Thematic Mapper System	51065

14. DESCRIPTION OF CHANGE In specification 400.8-D-210, Rev B, section 3.3.4.3, delete the sentences "The converter(s) shall operate at frequencies that are integral multiples of, and/or synchronized with the scan rate of the TM. The synchronizing clock signal shall be obtained from the multiplexer."

15. NEED FOR CHANGE At discrete power bus voltages, the synchronization signal may introduce an occasional instantaneous over-current shutdown. In orbit, each shutdown could interrupt picture making for ten to fifteen seconds. Removal of synchronization has been proven to be no detriment to system performance.

16. EFFECT ON ASSOCIATED EQUIPMENT
None

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
S/N 002	None
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED KIT DELIVERY SCHEDULE**
None	N/A

21. ESTIMATED COSTS/SAVINGS
N/A

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
H R Phillips	Program Manager

23. APPROVAL/DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE
NASA/GSFC	Kenneth Cureton	8/31/82

FORM 1 DEC. 68 1693 S/N-0102-020-6500

ENGINEERING CHANGE PROPOSAL (SHORT FORM) (SEE MIL-STD-481 FOR INSTRUCTIONS)

DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
5/20/82	023	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
Santa Barbara Research Center 75 Coromar Drive, Goleta, CA 93117	11323	I		

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
11323	Temp Controller, Subassy 50942	11323	50942	G
	(A4) Electronics Test, Procedure	11323	50943	E
	for/ 16235			

8. TITLE OF CHANGE: Installation of capacitors to stop oscillations on the Temperature Controller Circuit Board.

9. CONTRACT NO. & LINE ITEM: NAS 5-24200

10. CONFIGURATION ITEM NOMENCLATURE: TM Top Assy.

11. IN PRODUCTION: [X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED: PWB Assy, Temp Controller (A4)

13. PART NO. OR TYPE DESIGNATION: 50942, Rev. G.

14. DESCRIPTION OF CHANGE

Mount and connect 2 ea. new 0.1 μF/100V capacitors on the board per EO 4343A to Dwg. 50942.

15. NEED FOR CHANGE: Capacitance on the temp. sense diodes' lines causes their bias control loops to oscillate. The oscillations are at a low amplitude and at approximately 200 kHz, which is above the video bandwidth. It is not considered good practice to allow the oscillations to exist because there is no certain control over their future effect on the TM system.

16. EFFECT ON ASSOCIATED EQUIPMENT: None.

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
51065 SERNO 3 AND SUBQ	None
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED KIT DELIVERY SCHEDULE**
51065 SERNO 2	5/8/82

21. ESTIMATED COSTS/SAVINGS: None. Reliability improvement.

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
K Ebony for F.R. Phillips 5-21-82	PROGRAM MANAGER

23. APPROVAL / DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE	DATE
	Paula R Burnett	6/11/82

DD FORM 1 OCT 68 1693 S/N-0102-020-6500

SANTA BARBARA RESEARCH CENTER
A Subsidiary of Hughes Aircraft Company

INTERNAL MEMORANDUM

TO F. R. Phillips CC. Distribution DATE. 27 May 1982

REF: HS236-8006

SUBJECT: Tests on F1 TM Backup Shutter FROM. N. F. Current

BLDG. B12 MAIL STA. 58

EXT. 6198

To confirm that the addition of the 3 ea. 0.01μF capacitors and the change in resistor R60 to 17.4K would have no unexpected bad effects on the operation of the system, a test was made this morning under FR's S 8128, 8129 and 8372.

At least five consecutive, successfully locking turn-on's were done (with no failures to lock) with the power supply sync lines open and closed and the scan line corrector on. Then the following timing measurements were made with the same conditions:

Test Procedure TP 32015-532, Paragraph

5.2.1.39	SME 1 SAM Mode.
5.2.1.46	SME 2 Bumper Mode.
5.2.1.51	SME 2 SAM Mode.
5.2.1.58	SME 1 Bumper Mode.

There were no failures to lock each time the Backup Shutter was turned on. All timing measurements were within specifications, as recorded on pp. 43 and 44 of the F1 System Test Log.

This test shows that the proposed circuit changes have no adverse effects on system operation. Accordingly, EO's 4432A and 4433A with their ECR's, Deviation/Waiver D153 and ECP 024 have been prepared to authorize the PWB changes and are ready for signature.

NF Current
N. F. Current

NFC:are

Distribution

Brandshaft, D. G.
Brown, A. C.
Buckley, R. C.
Cannon, G. W.
Evans, L. B.
Gritt, G. B. (NASA)
Long, L. E.
O'Connell, L.
Plews, G. S.
/Sciacca, T. P. (NASA)/
Young, D. (AF)

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HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

S 8372

ORIGINATOR

1 PROGRAM NAME AND NUMBER	2 GLA	3 MODEL	4 TIME OBSERVED	5 DATE OBSERVED
TM	V411	FLT	1:00 PM	MO 5 DA 6 YR 82

6 HARDWARE LEVEL WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☒ SYSTEM ☐ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☐ MODULE ☐ MICAM ☐ CARD ☐ PART

EQUIPMENT IDENTIFICATION	NAME	PART NUMBER	S/N	MANUFACTURER
7 SUBSYSTEM				
8 UNIT				
9 ☐ ASSEMBLY ☐ SUBASSEMBLY				
10 ☐ MODULE ☐ MICAM ☒ CARD	5139 & Red. Shutter Driver	51378		SBRC
11 OTHER				

12 TEST WHEN FAILURE WAS OBSERVED: ☐ DEVELOPMENT IN PROCESS ☐ QUALIFICATION ACCEPTANCE ☒ INTEGRATION SYSTEM ☐ LAUNCH OPERATIONS

13 ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☒ AMBIENT ☐ EMC/RFI ☐ RADIATION ☐ VIBRATION ____ AXIS FOR ____ MIN TYPE ____ ☐ THERMAL VAC ____ HRS AT ____ ° ____ ☐ OTHER

14 DESCRIPTION OF FAILURE: Redundant Shutter would Not phase Lock

15 TEST PROCEDURE	PARA	16 ORIGINATOR	ORG	DATE	17 CONTINUATION SHEET USED
TP 7015-532	52.1.39	L Enama	2213	5/6/82	☐

ENGINEERING EVALUATION

18 VERIFICATION AND FAILURE ANALYSIS

19 FAILED ITEM NAME AND PART NUMBER

20 ☐ FOLLOWING REWORK/RETEST REQUIRED
☐ REWORK/RETEST NOT REQUIRED BECAUSE

21 AUTHORIZATION	ORG	DATE	22 CONTINUATION SHEET USED
			☐

MANUFACTURING AND TEST

☐ REWORK/RETEST ACTION TAKEN

24 QA REWORK

25 QA RETEST

26 LIST ALL PARTS REPLACED PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER

27 REWORK BY	ORG	DATE	28 RETESTED BY	ORG	DATE	29 CONTINUATION SHEET USED
						☐

ENGINEERING/RELIABILITY

30 CAUSE AND CORRECTIVE ACTION

31 CONTINUATION SHEET USED ☐

32 FRB CLOSURE

32 DOCUMENT IMPLEMENTING CORRECTIVE ACTION

34 BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☐ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET UP ☐ MFG PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR-OUT ☐ UNKNOWN — DEFECT CODE

35 FAILURE TYPE: ☐ PRIMARY ☐ INDUCED ☐ UNKNOWN ☐ NO FAILURE

36 FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☐ MINOR ☐ SAFETY

37 RESPONSIBLE ENGINEER	ORG	DATE	38 SPACECRAFT SYSTEM ENGINEER	ORG	DATE

39 RELIABILITY	ORG	DATE	40 CUSTOMER OR SUPPLIER	DATE

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HUGHES

HUGHES AIRCRAFT COMPANY
SPACE AND COMMUNICATIONS GROUP
EL SEGUNDO, CALIFORNIA

SPACE AND COMMUNICATIONS GROUP

FAILURE REPORT

S 8372

ORIGINATOR

1 PROGRAM NAME AND NUMBER	2 GSA	3 CODE	4 TIME OBSERVED	5 DATE OBSERVED
TM	V411	F-T	1:00 PM	MO 5 DA 6 YR 82

6 FAILURE RELEASED WHEN FAILURE WAS OBSERVED: ☐ SPACECRAFT ☒ SYSTEM ☐ SUBSYSTEM ☐ UNIT ☐ ASSEMBLY ☐ SUBASSEMBLY ☐ MODULE ☐ MICAM ☐ CARD ☐ PART

EQUIPMENT IDENTIFICATION	NAME	PART NUMBER	S/N	MANUFACTURER
7 SUBSYSTEM				
8 UNIT				
9 ☐ ASSEMBLY ☐ SUBASSEMBLY				
10 ☐ MODULE ☐ MICAM ☒ CARD	5129 y Red. Shutter Driver	51378		SBRC
11 OTHER				

12 TEST WHERE FAILURE WAS OBSERVED: ☐ DEVELOPMENT ☐ PROCESS ☐ QUALIFICATION ☐ ACCEPTANCE ☒ INTEGRATION ☐ SYSTEM ☐ LAUNCH OPERATIONS

13 ENVIRONMENT WHEN FAILURE WAS OBSERVED: ☒ AMBIENT ☐ EMC RFI ☐ RADIATION ☐ VIBRATION ☐ TEMP ____ ° ____ ☐ THERMAL VAC ____ MBAR ____ ° ____ AXIS FOR ____ MIN TYPE ____ ☐ OTHER

14 DESCRIPTION OF FAILURE: Redundant Shutter would not phase Lock

15 TEST PROCEDURE: TP52015-532 | 16 PARA: 52 1.3.9 | 17 OPERATOR: L Evans | 18 ORG: 2443 | 19 DATE: 5/6/82 | ☐ CONTINUATION SHEET USED

ENGINEERING EVALUATION

20 VERIFICATION AND FAILURE ANALYSIS

23 FAILED ITEM NAME AND PART NUMBER

24 ☐ FOLLOWING REWORK RETEST REQUIRED ☐ REWORK RETEST NOT REQUIRED BECAUSE

21 AUTHORIZATION | ORG | DATE | 22 ☐ CONTINUATION SHEET USED

MANUFACTURING AND TEST

25 REWORK RETEST ACTION TAKEN

26 ☐ REWORK

27 RETEST

28 LIST ALL PARTS REPLACED

PART NUMBER	CKT SYM	PART LOT NUMBER	DATE CODE	MANUFACTURER	PROBABLE DEFECT	ANALYSIS NUMBER

29 REWORK BY | ORG | DATE | 30 RETESTED BY | ORG | DATE | 31 ☐ CONTINUATION SHEET USED

ENGINEERING/RELIABILITY

32 CAUSE AND CORRECTIVE ACTION

33 FRB CLOSURE

34 ☐ CONTINUATION SHEET USED

35 DOCUMENT IMPLEMENTING CORRECTIVE ACTION

36 BASIC CAUSE OF VERIFIED FAILURE: ☐ DESIGN ☐ ENVIRONMENTAL ☐ DEFECTIVE PARTS ☐ TEST EQUIPMENT ☐ TEST PROCEDURE ☐ TEST SET UP ☐ MFG. PROCEDURE ☐ ASSY/FAB ERROR ☐ WORKMANSHIP ☐ WIRING ERROR ☐ ROUGH HANDLING ☐ WEAR OUT ☐ UNKNOWN | DEFECT CODE

37 FAILURE TYPE: ☐ PRIMARY ☐ INDUCED ☐ UNKNOWN ☐ NO FAILURE | 38 FAILURE CLASSIFICATION: ☐ CRITICAL ☐ MAJOR ☐ MINOR ☐ SAFETY

39 RESPONSIBLE ENGINEER | ORG | DATE | 40 SPACECRAFT SYSTEM ENGINEER | ORG | DATE

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

Reply to Attn of: 284.4

Santa Barbara Research Center
Attention: E. A. Dawson
75 Coromar Drive
Goleta, CA 93017

Subject: Contract NAS5-24200 for Thematic Mapper, Approval of Deviation and ECP (GSFC CCR's 399 and 401)

The following deviations and waivers have been approved by the Landsat-D CCB.

D-153 - Capacitor addition to assure phase lock

ECP-024 - Capacitor addition to assure phase lock

The signed DD 1693 and DD 1694 are enclosed for your files.

Elizabeth Austin
Contracting Officer

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...CHANGE PROPOSAL (SHORT FORM) (...(MIL-STD 481A INSTRUCTIONS)	DATE PREPARED	ECP NO.	PROCURING ACTIVITY NO.
	5/26/82	024	

1. ORIGINATOR NAME AND ADDRESS	2. MFR. CODE	3. CLASS OF ECP	4. JUST. CODE	5. PRIORITY
Santa Barbara Research Center 75 Coromar Drive, Goleta, CA 93117	11323	I		

6. SPECIFICATIONS AFFECTED		7. DRAWINGS AFFECTED		
MFR. CODE	SPECIFICATION/DOCUMENT NO.	MFR. CODE	NUMBER	REV.
11323	PWB Assy Cal Shutter, Backup	11323	51398	E
	51398, Rev. E	11323	51399	C

8. TITLE OF CHANGE	9. CONTRACT NO. & LINE ITEM
Capacitor addition to assure phase lock.	NAS5-24200

10. CONFIGURATION ITEM NOMENCLATURE	11. IN PRODUCTION
Thematic Mapper Top Assembly	[X] YES [ ] NO

12. NAME OF PART OR LOWEST ASSEMBLY AFFECTED	13. PART NO. OR TYPE DESIGNATION
PWB Assembly, Cal Shutter, Backup, Rev. E	51398, Rev. E

14. DESCRIPTION OF CHANGE

Capacitors are proposed to be added across the phototransistor leads per EO's 4432A and 4433A. The threshold voltage determined by R60 is also to be changed to approx. +1.5V by changing the value of R60 to compensate for the timing shift between the dc restore pulse and the shutter shadow that results due to the added capacitors.

15. NEED FOR CHANGE

With the power supply sync lines opened to prevent random shutdown, the standby shutter sometimes failed to phase lock. Noise picked up on the phase reference pickoff phototransistor leads caused random transitions in the outputs of the flip-flops driven by the phototransistor comparators. The random transitions caused 180° phase reversals at the phase detector output and confused the phase lock loop, preventing it from locking. See Failure Report S8372.

16. EFFECT ON ASSOCIATED EQUIPMENT

None

17. PRODUCTION EFFECTIVITY BY SERIAL NO.	18. EFFECT ON PRODUCTION DELIVERY SCHEDULE
51065, SERNO 3	None for F1.
19. RECOMMENDED RETROFIT EFFECTIVITY	**20. ESTIMATED KIT DELIVERY SCHEDULE**
	6/1/82

21. ESTIMATED COSTS/SAVINGS

None. Functional improvement.

22. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE	TITLE
H.E. Phillips	Program Manager

23. (APPROVAL) / DISAPPROVAL

GOVERNMENT ACTIVITY	SIGNATURE / DATE
	Paula R. Burnett 6/30/82

DD FORM 1 DEC 68 1693 S/N-0102-030-6500

4.4 NON-CONFORMING MATERIAL

The following section lists the non-conforming material Reports (NCMR) that were generated during the Flight Model Fabrication tasks. Copies of the NCMR's are maintained at the contractor's facility and are available for review.

NCMR's

NO.	277572 - P/N	51480(A) - Frame Silicon DET and Preamp
	277573 -	50797(D) - Silicon DET and Preamp Assy.
	277671 -	50973(B) - Cold Focal Plane Assy.
	277772 -	50797 - Silicon DET. and PreAmp Assy. Band 1
	277773 -	52420 - Filter Retainer
	277776 -	50955 - Cooled Focal Plane
	277777 -	50958 - DET Array, Bands 5&7 InSb
	277790 -	50799-1(A) Quartz Substrate
	277794 -	50958 - Detector Array Band 7
	277800 -	50958(B) - Detector Array Band (-)
	288469 -	52451(A) - Filter Assy. - Band 1
	294836 -	51337(D) - Telescope Assembly
	294837 -	52249(F) - Redundant Shutter
	294838 -	50809 - Substrate, LED Source
	294839 -	52347 - Electronic Module
	294842 -	51512 - Aft Optics Assy.
	294852 -	51672 Rev. A - Lens Spacer
	294854 -	52049 Rev C - Shim RAD Cooler Adapter
	294859 -	50980 Rev E - Cooled Focal Plane Housing Preamplifier
	294861 -	51740 Rev E - RAD Cooler Door Assy.
	294862 -	51740 Rev E - RAD Cooler Door Assy.
	294888 -	44220-2 - Mirror Mount
	294889 -	45769 Rev A - Nut plate
	295099 -	52347 Rev B - Elect. Module Assy.
	298142 -	51402 - TLMY Scaling - fuse link Lamp
	298645 -	50904-1 - Post Amp PWB Bundl
	299608 -	51337 Rev. A - Telescope Assy.
	299663 -	51337 Rev. D - Telescope Assy.
	299681 -	51512 - AFT Optics Assy.
	299684 -	54211 Rev. A - Frame, Silicon Det. & PreAmp - Bracket
	299686 -	54180 Rev. A - Frame
	299687 -	51337 Rev. D - Telescope Assy.
	359650 -	90-50968 - Spare PWB Distribution Cold Focal Plane
	359651 -	51015(B) - Silicon Preamp Assy.
	359652 -	51015(D) - Silicon Preamp Assy.
	359655 -	50958(B) - Band 7 InSb Array
	359661 -	50973(B) - Cold Focal Plane Assy.
	359663 -	50802-1(E) - Substrate, Silicon Det. Preamp
	359797 -	52420 - Filter Retainer
	359800 -	51015-1(D) - Silicon Preamp Assy
	360066 -	50802-1 - Substrate E, Silicon Det. Preamp
	360077 -	50795 - Prime FPA
	386729 -	50903(E) - Flex Printed Wiring Cable
	386730 -	51394 - Flex Printed Wiring Cable
	386755 -	51209 Rev. D - Cover, Intermediate Stage
	386757 -	51200 - Rad Cooler
	386758 -	50980 - Preamp Module Assy.
	386759 -	52566-2(C) - SMA Strip Heater
	392151 -	51015-1(D) - Silicon Preamp Assy.
	392154 -	50797-1(E) - Silicon Detector and PreAmp Assy.
	392155 -	50807-(H) - Led Source Silicon Focal Plane Assy.
	392156 -	50968(B) - PWB, Distribution, Cold Focal Plane
	392546 -	51015-1(D) - Silicon Preamp Assy.
	392547 -	50973 (B) - Cold Focal Plane Assy.
	392551 -	50955 - C.F.P./Cold Finger Assy.

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NCMR'S

NO.	392555 - P/N	50958(B) - InSb Array
	392557 -	50797(D) - Silicon Detector and preamp Assy.
	393227 -	50973(B) - Cooled Focal Plane Assy.
	393244 -	50795 - Flight Prime Focal Plane Assy.
	393245 -	52421 - Flight Assy.
	393246 -	52421 - Filter Assy.
	393247 -	52421 - Filter Assy.
	393248 -	52421 - Filter Assy.
	393250 -	51015 - Silicon Preamp Assy.
	393251 -	50970 - FPWA Cooler Cable Band 5
	393252 -	50958 - InSb Det. Array Band 7
	393253 -	50958 - InSb Det. Array Band 5
	393254 -	51333-99C- Filter Mount Sub Assy, Spare
	393255 -	51333-98C- Filter Mount Sub Assy, Spare
	393256 -	50795 - Silicon Focal Plane Assy.
	393261 -	50968 - PWB, Distribution, Cold Focal Plane
	393268 -	50961
		(50955)(E)- Cooled Focal Plane Finger Assy.
	393269 -	50802
		(50797)(E)- Silicon Detector and preamp Assy.
	393272 -	50992
		(50973)(B)- Cold Focal Plane Assy.
	393273 -	50797(E) - Silicon Detector and PreAmp Assy.
	393274 -	51480
		(50797-1)(E) - Silicon Detector and PreAmp Assy.
	393275 -	50803
		(50797)(E) - Silicon Detector and PreAmp Assy.
	393276 -	50973(B) - Cold Focal Plane Assy.
	393277 -	50797(E) - Silicon Detector and PreAmp Assy.
	393278 -	50807(H) - LED source/silicon FPA
	393279 -	50802-1(E) - Substrate, Silicon Detector Preamp
	393280 -	50807(H) - LED source-silicon FPA
	393281 -	50955(E) - Cooled Focal Plane/Cold Finger Assy.
	393282 -	50955(E) - Cooled Focal Plane/Cold Finger Assy.
	393283 -	50955(E) - Cooled Focal Plane/Cold Finger Assy.
	411554 -	51402 - PWB Assy. Telemetry sealing
	411649 -	52797 - Aux. Circuit Board
	411881 -	53060 REV A - Analoy Processor (A4)
	411979 -	53286 REV D - Cable Assy. (W3) Heater and Sensor Band 6
	412432 -	51402 - Telemetry Scaling PWB
	412442 -	52788 - Cable Harness
	412446 -	50860 - Silicon Detector PreAmp
	412471 -	50916 - PWMB Assy. Cal Shutter Main
	? -	50955 - CFP/Cold Finger Assy.
	412473 -	50916 - PWB Assy. Calib Mainshutter A6
	412474 -	50904-3 - PWB Assy. Post Amp Band 1-4
	412478 -	52360 - Top Cover
	412487 -	53757 REV B - Elect. Assy. Reg Module
	425451 -	50869 - Power Supply
	411836 -	509082-2 - PostAmp Band 7
	412016 -	50904 - PostAmp Bds.
	392150 -	50797-2 - Silicon DET and PreAmp Assy.
	386761 -	52052-3 - SHIM, Cooler Shroud
	412015 -	50904-4 - Post Amp Band 4
	411920 -	50904-2 - PWB Assy. Post Amp 1-4

NCMR'S

No.	298649 - P/N	51065	-	Thematic Mapper Assy.
	299665 -	52483	-	Shutter Arm Assy - Cal/Restore
	412016 -	50904	-	Post Amp. Bds.
	411836 -	50908-2	-	Post Amp. Band 7
	299645 -	51512	-	Aft Optics Assy. TM
	299630 -	53414	-	Transformer Assy.
	412468 -	52347	-	Electronic Module Assy.
	294814 -	50843	-	AFT Optics Support